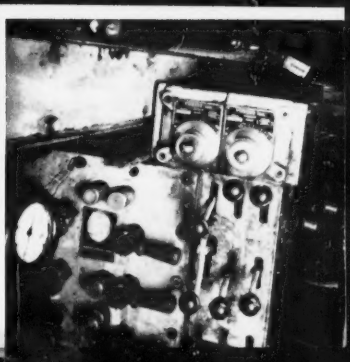
COAL MINING

"The Picture-Book of the Industry"

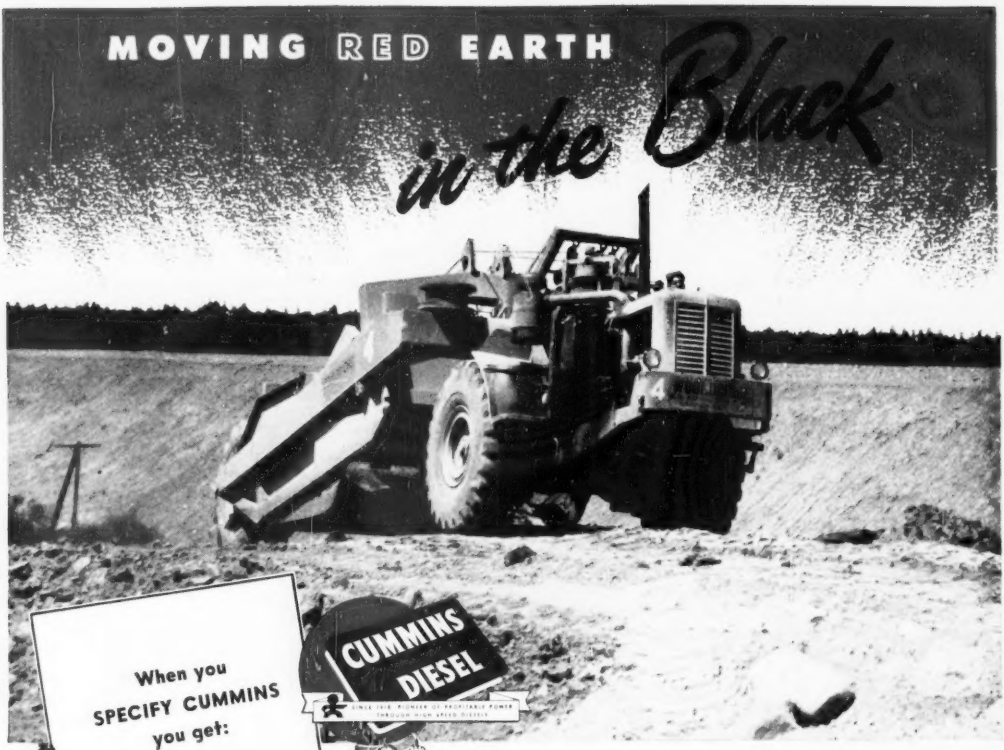
FEBRUARY 1949 VOLUME XXVI, No. 2

The Sunnyhill Coal Company's COLMOL starting 45 degree crosscut from a 14 foot wide butt entry in the Upper Freeport seam of coal at Masontown, West Virginia. Note straight-away grooves made in roof by the revolving cutters when driving the entry. The COLMOL loaded a 3-ton shuttle car in 45 seconds, making this 45 degree crosscut.



The control panel of the COLMOL incorporates airplane type finger tip controls. ⟶

MOVING RED EARTH *in the Black*



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- 'Round-the-clock service

3,000 yards of overburden moved each eight-hour shift . . . 400,000 yards in the first 12 weeks on the job . . . that's the record of four Cummins-Powered Wooldridge Terra-Cobras being used by the Haley-Young Mining Company at the Elbern Mine near Chisholm, Minn.

Powered with Model HBISD-600 Cummins Diesels, these earth movers each maintain an average of 70 loads every eight hours on the one-mile round trip . . . carrying 11.5 yards of material each trip and working on grades up to 12 per cent. In this high-speed stripping operation, Haley-Young also uses six Euclid Rear Dumps and a Lima 1201 shovel . . . all powered with Cummins Diesels.

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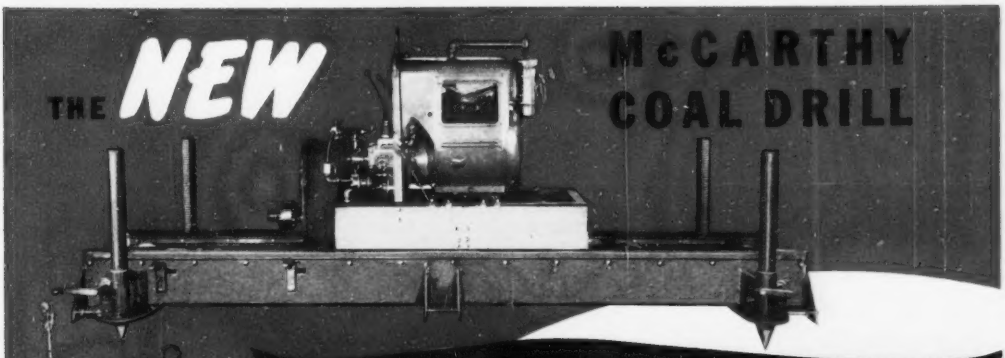
THE NEW McCARTHY COAL DRILL



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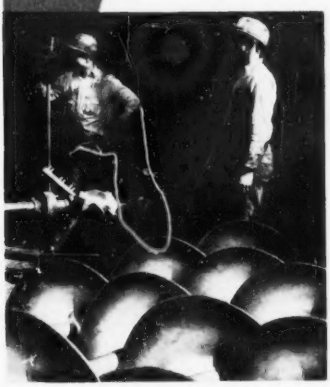

A close-up view of the drill head. The spiral operation of the auger conveys the coal from the working. A portable conveyor may be used to load coal into a truck as it is drilled from the seam.

The McCarthy coal drill provides a new method of mining extra tonnage from workings where overburden expense prevents further stripping. With augers of 12, 16, 20, 24 and 30-inch diameters, and where overburden is firm, as much as 75% of the coal can be removed to any reasonable depth. And coal taken from the heart of the seam by this method is clean and dirt-free.

The new McCarthy coal drill provides an inexpensive method of mining coal that previously was considered a loss . . . will add an extra "bonus" to your coal mining operations. Write or phone today for complete information on this time-saving, "extra tonnage" coal drill.

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S. J. Groves strips overburden near Johnstown with Lima 1201. Machine is equipped with a 42' 0" boom, 32' 0" dipper handle and 2½ cubic yard dipper.

McCombie Coal Co., near Barnesboro, strips with dragline. Lima "precision" air control gives a new ease of operation impossible in ordinary machines.

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Frank Mashuda, near Dunbar.

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A-2066

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Does teacher know the up-to-date facts about the bituminous coal industry? She (or he) should, but it's pretty hard to keep up with the latest developments.

To increase nation-wide understanding of our industry, the Bituminous Coal Institute advertises regularly in the magazines of the teaching profession. Through pictorial advertisements, teachers see for themselves how modern mining methods eliminate hard manual labor and increase efficiency. They learn how mechanization has helped to make the American coal miner easily the most productive in the world. They get the facts about coal miners' high wages.

To aid the teacher further, we offer two booklets—*Old King Coal Calls a New Tune!* and *Pertinent Facts about Coal*—free to any teacher who mails in the coupon our advertisements carry. So far we have given away—only in response to these written requests—almost a million such pamphlets.

A word from you may help this material reach the schools and teachers in your community. Your action will give this *national* program greater *local* impact.

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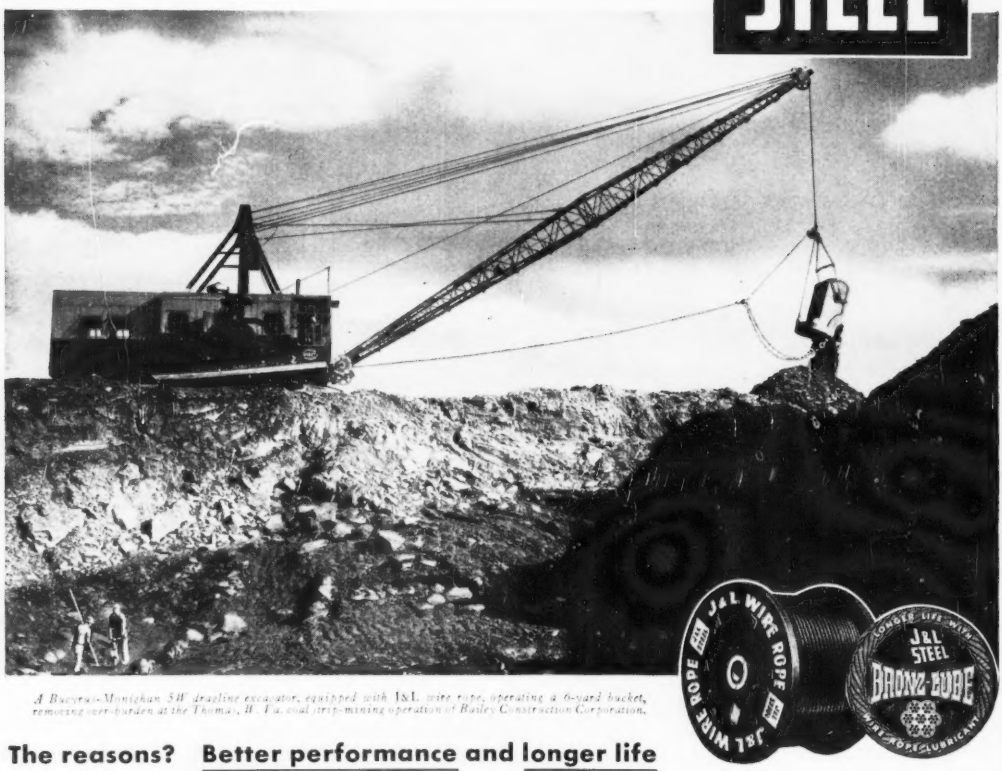
—scientific coal strip-mine operator—

prefers J&L *Precisionbilt* Wire Rope

J&L STEEL



A Bucyrus-Monighan 5W dragline excavator, equipped with J&L wire rope, operating a 6-yard bucket, removing over-burden at the Thomas, W. Va. coal strip-mining operation of Bailey Construction Corporation.

The reasons? Better performance and longer life assured by J&L wire rope engineering service.

Bailey Construction Corporation, organized by Mr. Harold L. Bailey, noted coal mining engineer of Schuylkill Haven, Pa., has two coal strip-mining operations under way in West Virginia. One near Thomas, in Tucker County, has four working pits now in operation. The other, soon to be in full production, is at Lorado in Logan County.

On every piece of Bailey's modern equipment . . . draglines, shovels, bull-dozers . . . you'll find J&L *Precisionbilt* Wire Rope in a variety of sizes and types, each designed to do a particular job.

One of the basic principles of all Bailey operations is this: *Use only the very best of equipment—and use it properly.*

That's why Bailey has standardized on J&L *Precisionbilt* Wire Rope. Says Mr. Bailey: "Our experience has proved that the combination of J&L Wire Rope and J&L engineering service gives us better performance, longer rope life and lower over-all costs."

There's a growing list of top flight companies engaged in earth-moving, oil production, lumbering, general manufacturing and transportation, that use J&L Wire Rope *exclusively!* Like the Bailey Construction Corporation, they find that J&L *Wire Rope* and J&L *Engineering Service* work together to cut costs and increase profits.

If you are interested in getting the complete details on J&L *Wire Rope Engineering Service* and what it can do for you, why not clip the coupon?

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Install it in 2 minutes . . . without tools

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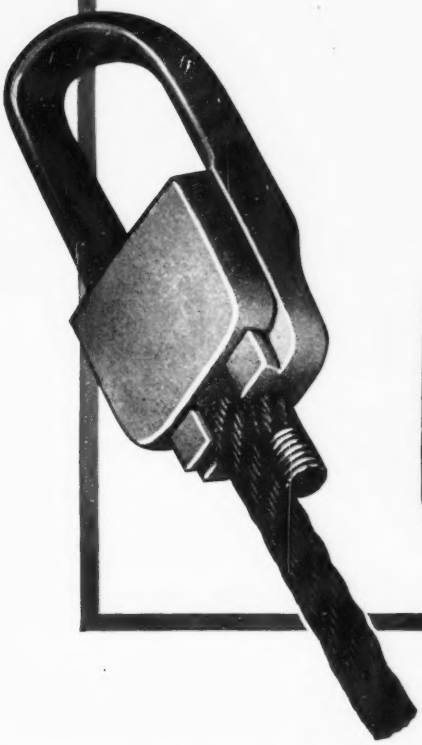
THE BOWDIL Rope Socket was designed to make quick rope replacement without tools. It can be installed anywhere in two minutes. To install it, it is merely necessary to position the rope, place the cap in position and go to work. The tension on the rope tightens the wedge-shaped cap and the greater the tension the tighter it holds. To replace broken cable, it is only necessary to drive the cap back, releasing the grip on the rope. The heavy dove-tailed cap is easily removed with a few sharp blows of the hammer and has ample body for striking.

The Bowdil Rope Socket reduces the danger of mashed, scratched or punctured fingers, common causes of delays and infections. Special hook clamp on the eye end permits instant connection to any point on a long guide line without injury to the rope.

The offset eye design gives greater protection to the rope as the pull is straight out from the socket.

The Bowdil Rope Socket is forged from high-tensile alloy steel, heat treated for maximum strength, thus permitting the use of lighter, less-bulky parts.

Bowdil Rope Sockets are made to accommodate rope of various sizes from ½" to 1". Inquiries for special application are welcomed.



Part No.	
704	. . . . ½" Rope Socket
706	. . . . ⅝" Rope Socket
707	. . . . ¾" Rope Socket
708	. . . . 1" Rope Socket

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Outstanding Performance for Stripping Operations

Capacities 6 to 35 Cubic Yards

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COAL MINING

VOL. XXVI FEBRUARY, 1949 NO. 2

Contents

	Page
Do You Know	13
Here And There	13
Sunnyhill Coal Company's Colmol	15
Recent Procedure To Control Dust in Mine Air	19
The Coal Mining Institute of America Holds 62nd Annual Meeting	23
Coal Is Stripped In Alabama Too	26
World's Largest Coal Plant Takes Shape	28

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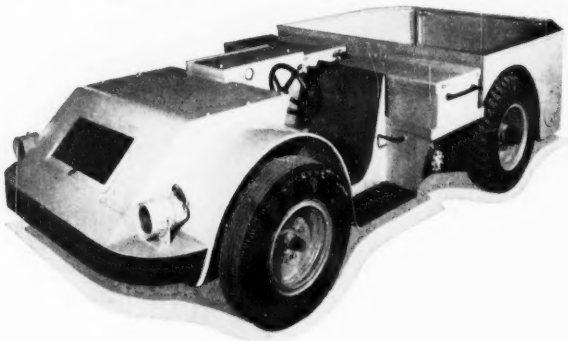
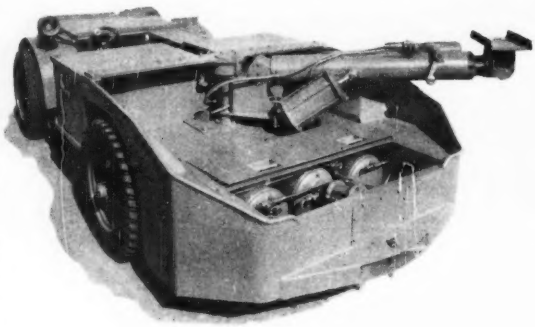
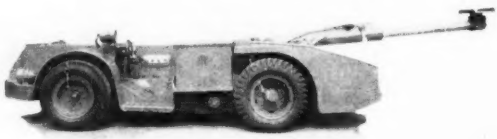




TIMBER BOOM

Telescoping timber mounted on rear platform.
Operated by two air lifting cylinders
Self leveling timber head
Swing 55° to each side of center
Hand swing with automatic air brake stop
Hand operated telescoping and 36" extension



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For handling supply and materials needed for operating and maintenance crew.

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For pulling rubber tired trailers, with timber and other supply, also to pull miscellaneous equipment such as rock dusters, air compressor units, etc.

3 GREASE & SERVICE UNIT
Fully equipped with air operated oil and grease guns for complete lubrication of mining machinery at the working face.

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Equipped with air operated timbering boom and power driven timber saw.

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Four speed transmission gives power and speed for pulling post.
Can also be equipped with electric driven winch.

GENERAL DIMENSIONS

Overall height	36"
Overall width	76"
Overall length	14'-7"
Wheel base	80"
Timber boom-Max. height	8'-6"
Timber boom-Max. Swing	55° each side of center

Please write for bulletin and complete information.

Lee-Norse Company
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. DO YOU KNOW .

The ten most important science advances made during 1948, as picked by Watson Davis, director of Science Service, are:

1. Creation artificially in world's largest cyclotron of subatomic particles, called mesons, that may unravel mystery of composition of matter.

2. Achievement by jet plane of speeds well beyond the barrier of the speed of sound, opening a new air age.

3. Demonstration that a single penicillin pill, swallowed a few hours after exposure, can prevent one of the two major venereal diseases, gonorrhea.

4. Synthesis of glycerine from petroleum, making its commercial production independent of fat supply.

5. Discovery of aureomycin and polymyxin, drugs effective against diseases unconquered by sulfa drugs and other antibiotics.

6. Completion of the 200-inch world's largest telescope on Mt. Palomar, Calif., seeing deepest ever into cosmic space.

7. Authorization of two gigantic atom smashers, to produce three to five years hence sub-atomic "bullets" rivaling cosmic rays of three to seven billion electron- volts, vastly extending scope of nuclear physics.

8. Commercial production of "low-temperature" rubber, giving chemical rubber superiority over natural rubber.

9. Discovery of the fifth moon of the planet Uranus, with 30-hour orbit.

10. Use of neutrons to explore the structure of matter by production of diffraction pattern photographs.

* * *

One obstacle to the development of a steel industry in the West has been the scarcity of good coking coals. The abundant coals of the Utah type have such a high content of waxes and oils that they cannot be converted into coke "as is."

In an endeavor to overcome this difficulty, Ernest J. Schabelitz of Rincon, Calif., has developed a solution method for removing these objectionable substances, on which he has just received U. S. patent 2,453,543. He uses ethylene dichloride as solvent, simply soaking mine-run coal in it for an hour or so. The waxes and oils are separated from the drained-off solvent by distillation and processed for industrial uses. The solvent is condensed for re-cycling. The coal, after residual solvent has been removed by low-temperature heating, is ready for coking.

* * *

Titanium metal has recently been produced by the U. S. Bureau of Mines This silver-white metal is light and strong, is highly resistant to corrosion and has high melting point. Titanium is plentiful in nature, being the seventh common metal and the ninth most common element in the earth's crust.

* * *

Bacitracin, the antibiotic discovered in 1945, is now available commercially, but you will need a physician's prescription to get it.

The drug has proved effective in the treatment of many skin and local surgical infections, such as boils and abcesses, often making surgery unnecessary. It also checks the growth of many gram-positive streptococci and staphylococci, as well as the pneumococcus, gonococcus, meningococcus and the spirochete of syphilis.

It was isolated by Dr. Frank L. Meleney of the Columbia College of Physicians and Surgeons from the infected wound of a patient.

* * *

A relative'y new family of organic chemical compounds known as fluorocarbons promises to have many important industrial applications in the future, ranging from combustion-resistant hydraulic fluids for airplanes to anesthetics, insecticides and germicides.

One important application will be as lubricants of unprecedented stability, for example an oil so stable that it will permit construction of engine hitherto impossible because no known lubricant could withstand their pressure and friction. Another important application is new plaster extremely resistant to chemical reaction in which a derivative of fluorocarbons is employed.

Fluorocarbons are similar to the hydrocarbons of petroleum, but differ in that all the hydrogen is replaced by fluorine. The hydrogen is the point of chemical attack in the hydrocarbons. The absence of hydrogen in the fluorocarbons gives them extraordinary chemical inertness.

* * *

Vitamin K, important for its capacity to check dangerous bleeding from wounds, can be prepared in forms that will keep longer without deterioration, by a process on which U. S. patent 2,456,686 has just been granted to a group of scientists at St. Louis University school of medicine, headed by Dr. Edward A Doisy, Nobel prizeman in medicine and physiology in 1944. Rights in the patent have been assigned to the university, and any profits realized on it will be plowed back into further research.

The new varieties of vitamin K are chemically described as its hydroquinone form, or the diester or diether of this form. While these forms can be prepared by the treatment of pure vitamin K, in practice they are usually obtained by treatment the raw materials from which the vitamin can be extracted. Among them are such miscellaneous and often unpromising-looking stuffs as alfalfa meal, spinach, soybean oil, liver and putrefied fish meal. The crude products are subsequently purified for clinical use.

* * *

Here's how to protect your bean crop from wild rabbits next spring, or from deer if you are in a deer country. Spray the foliage with a new chemical mixture which acts as a repellent to grazing animals after they chew a few leaves. Certain types of insects also are discouraged by the action of the chemical.

The new material is a development of the B. F. Goodrich Chemical Company, and was thoroughly tested by the Maine Fish and Game Department during the past year. Taste, not odor, is the big factor. It is not poisonous, but wild animals do not like its taste.

The compound is a vinyl resin. One application is sufficient until new leaf growth occurs. It can be used to protect other plants besides beans, and repels other animals besides rabbits and deer.

HERE AND THERE

President Charles A. Owen of the National Coal Association has announced the appointment of the Committee on Vocational Training and Education. Mr. Henry C. Woods, Vice President of the Sahara Coal Company, 59 East Van Buren Street, Chicago 5, Illinois, will act as Chairman. In naming this Committee Mr. Owen pointed out to the members that some two years ago the National Coal Association felt the necessity of giving some attention to vocational training and education. The thought behind that move was that for a period of time we have not been getting enough young men to enter the mining schools and colleges and equipping themselves for positions in the coal industry; also that a great deal of work was needed to be done with respect to vocational training of employees and that we should stimulate the interest of high school students in the mining of coal and make it as attractive as possible for those young men to take up work in this industry. This work has been carried on by Mr. M. D. Cooper on behalf of the National Coal Association, and he has made considerable progress with the schools and colleges. Mr. Owen, however, points out that Mr. Cooper needs the advice and counsel of a strong committee in the work that lies ahead. In addition to Mr. Woods as Chairman, the Committee is composed of:

Charles Dorrance, President, West Virginia Coal & Coke Corporation, Cincinnati, Ohio.

L. Ebersole Gaines, President, New River Company, Mount Hope, W. Va.

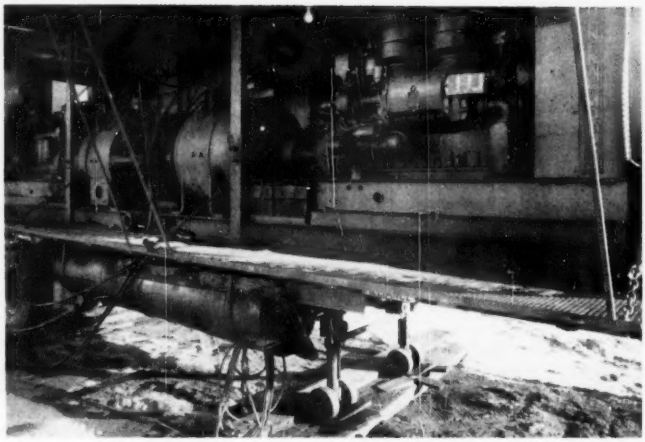
George M. Jones, Jr., Vice President, Cambria Mining Company, Toledo, Ohio.

A. F. McElhenie, Vice President, Pittsburg & Midway Coal Mining Company, Kansas City, Mo.

Charles J. Potter, President, Rochester & Pittsburgh Coal Company, Indiana, Pa.

Richard T. Todhunter, Jr., General Manager, Barnes & Tucker Company, Barnesboro, Pa.

Serving Power To The Colmol . . .



Four 6-cylinder General Motors Diesel Engines driving 75 kw generators, mounted on trailer designed and built by Ray C. Call furnishing power for the Sunnyhill COLMOL at its present location near Masontown, W. Va. Paralleled generators make 300 kw power. Reverse current releases automatically disconnect any out of step generator. Engines have pusher fans. Fuel tank mounted under trailer. Trailer completely closes equipment.

Our congratulations to the Sunnyhill Coal Company for its contribution to easier and faster coal mining. Developments like the COLMOL make Americans appreciate America and its highest standard of living in the world today.

General Motors Diesel engines supply power for the Sunnyhill COLMOL at its present location near Masontown, W. Va. Like for the Sunnyhill COLMOL General Motors Diesel engines supply power for all kinds of machines that mean better living and better things to come.

The Ray C. Call Company is proud to have engineered and designed the portable plant that is furnishing power to the COLMOL on its exhibition tour of the coal fields.

Ray C. Call Company's fast service cars are seen serving General Motors Diesel engines on deep mine equipment, on power shovels and tractors in strip mines, and on boats up and down the Ohio River from Steubenville, Ohio.

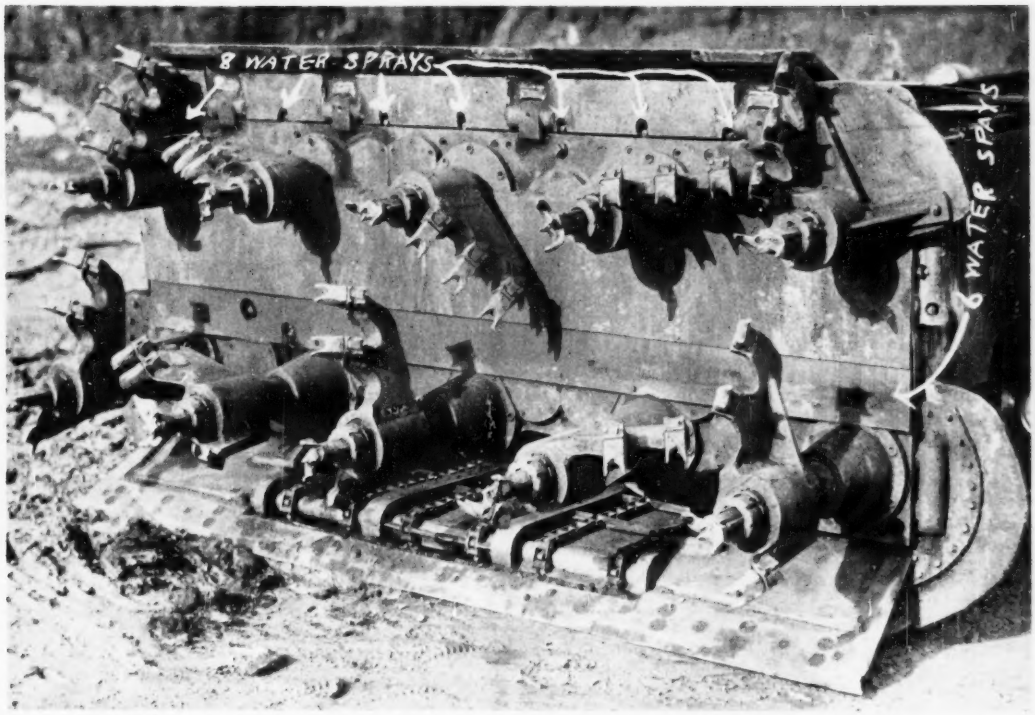
Our $75,000 stock of Diesel parts assures quick replacement service. We can exchange a whole engine in a very short time to keep essential equipment going. A well equipped repair shop is maintained for repair work that cannot be done in the field.

Our trained engineers will help solve your power problem.

One of Seven Ray C. Call Company service cars in front of the Steubenville plant.

RAY C. CALL COMPANY

Steubenville, Ohio **Charleston, West Virginia**



Head of the COLMOL, showing the two rows of cutters on the present machine and the arrangement of water sprays. Bottom cutters cut 4 inches deeper than top cutters and make 30 inch swing; top cutters make 28 inch swing. Bottom blade has been cut away to show arrangement of the coal conveyor that takes the coal away.

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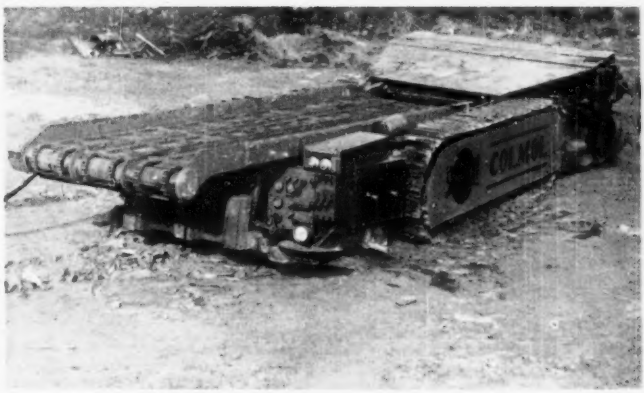
COLMOL

First Underground Action Pictures Of This Continuous Mining Machine

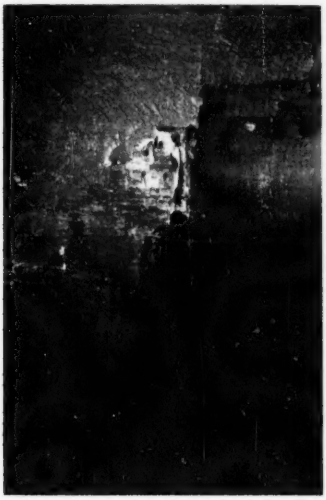
Man always had to work. In different parts of the world he works in different ways for his food and shelter. For millions of years man had only his own muscle power. When he began settling in villages, primitive society began to emerge and he learned to use animal power. Then followed the discovery of how to use water and wind to turn a wheel for making power. Later came the burning of wood for heat to make power for manufacture. Wood burning gave way to coal burning and coal burning and the steam engine replaced the water wheel and the wind mill.

In 1850 wood and coal generated 23% of the total power used. By 1900 coal supplied 50% of man's



Outside over-all view of the "Sunnyhill" COLMOL.

Side view of the revolving cutters as they bore into the face of the coal. Note how the lower row of cutters cut deeper into the face than the top row, allowing the top cutters to make larger sizes.



This is a side view of the face after it has been cut by the COLMOL.

work energy. By 1944, work output from mineral fuels—coal, oil and natural gas—was five hundred times greater than in 1850. Today mineral fuels and water power are doing 94% of our work, men and animals are doing 6%.

Front end of the COLMOL as seen at the beginning of the 45 degree crosscut. Both rib grooves are closed by flaps.

Mineral energy in the form of electricity to coal mines has done more than any one item to advance technology and technological procedure in American Coal Mines. Mineral energy has done more than any one item to improve the standard of living and the social advancement of the American Coal Miner. Advances of this nature that have been made to date may be short lived, however, if the American Coal Miner does not show the proper spirit to work with the operator in providing this nation with the coal it needs at a competitive cost with other fuels. Individual initiative and cooperative effort, working together toward a common and worthwhile goal are essential to the further advancement of the American Coal Mining Industry and the American Coal Miner.

The COLMOL, a new and revolutionary technological advancement in the method of producing deep mined coal, is a great step in furthering working and living conditions of the American Coal Miner. The COLMOL is a machine that continuously gouges out coal from a solid face without undercutting, drilling, loading or hand shoveling. The COLMOL bores forward like a mole in the ground, gouging out coal faster than man, as yet, has learned to get the coal produced away from the machine.

The COLMOL is mounted on two caterpillar tractor treads and has a square head that can be made to meet various heights of the coal seams. On the head are mounted 10 revolving pilot cutters, each cutter having 4 bits, staggered. On the machine shown in the story, the pilot cutters are mounted in two rows, 5 to a row. The bottom row of cutters are positioned 3 inches forward of the top row.

The top row of cutters runs in a 14 inch radius and has a 28 inch sweep. Bottom cutters run in a 15 inch radius and have a 30 inch sweep. Overlap of the cutters is 4 to 10 inches.

The machine is powered electro-hydraulically. The cutting heads under normal operation operate at hydraulic pressure of from 1100 to 1400 psi. The machine has operated successfully in Ohio Number six coal having an 8 inch hard binder and numerous sulphur balls, some having diameter up to 10 inches. If material is too difficult to cut at normal speed, pressure relief valves are actuated at 2100 psi and cutters stop to prevent any damage to the cutters. The machine may then be put into the face at slower speeds until the harder material is cut out. Should a heavy timber or large niggerhead be encountered which cannot be cut, the machine may be easily backed out to a crosscut for inspection of the face.

The top row of cutters can be raised 6 inches thus giving flexibility of 6 inches in the height of the cutter head. The entire head assembly, top and bottom rows, may be raised or lowered a total of 8 inches to take care of rolls in the bottom, tramming, etc. The head

can be titled 4 degrees forward or backward. On the machine shown, the minimum cutting height is 45 inches, maximum is 51 inches.

Water is sprayed on the cutter head through 8 spray nozzles placed across the top of upper row of cutters. Three water sprays are also located over the coal conveyor where it comes to the top of the machine. Spray water used is being treated with Compound "M" wetting agent.

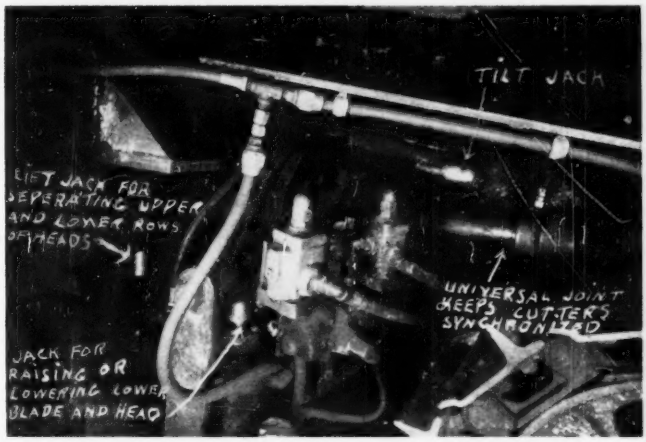
Having a revolving motion the cutters leave 5 grooves in the roof and 2 in each rib. In order to keep coal from spilling through the grooves in the rib, rubber flaps cut to the shape and size of the rib grooves are attached to the lower part of the head. Rib grooves made by the upper row of cutters are closed by a rubber flap attached to end cutter on each side of the head which closes the groove when the revolving cutter arm comes around to the rib in its circular motion. The sweeping action of the heads cooperating with the bottom blade and rubber flaps provide an almost perfect cleanup leaving less than 1% of the coal in the room.

A cutter blade is attached to the top of the head of this machine for smoothing off the 5 grooves made by the cutters. This blade has smoothed roof satisfactorily in the Ohio Number 5 seam and in the Pittsburgh seam of Western Pennsylvania. In the Upper Freeport seam at Masontown, West Virginia, where roof coal is overlaid with cannel coal that is noted for its springyness, attempts to smooth roof have not met with success.

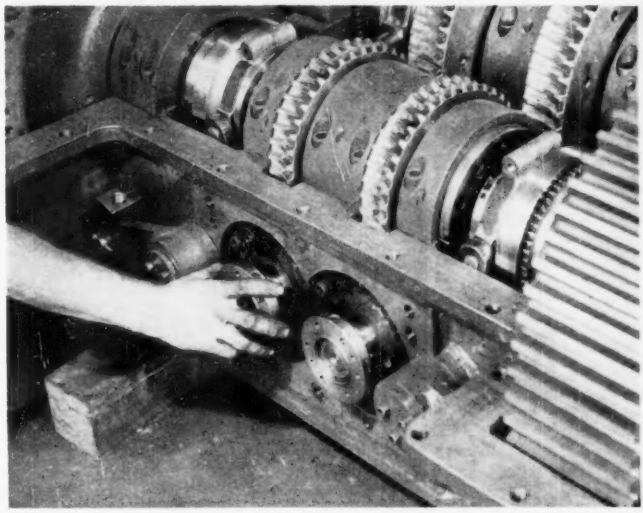
Overall length of the present COLMOL is 24 feet 9 inches long. Cutting width is 9 feet 6 inches; width of the machine is 7' 3". The conveyor is 50 inches wide. Power is furnished by two 30 hp motors which drive the head; one 25 hp motor which drives the conveyor and furnishes pressure to jacks; one 7½ hp motor for trimming. Operation is by a very light finger tip control.

Contrary to the belief of the average man in the industry, the present COLMOL can make crosscuts. In a 14 foot wide room, it can make a 45 degree crosscut in 30 feet; in an 18 foot wide room, it can make a 60 degree crosscut. The tractor drive is so sensitive and accurate that the

Face of the coal after it has been cut by the revolving cutters of the COLMOL.


TILT JACK
LIFT JACK FOR OPERATING UPPER AND LOWER ROWS OF HEADS
UNIVERSAL JOINT KEEPS CUTTERS SYNCHRONIZED
JACK FOR RAISING OR LOWERING LOWER BLADE AND HEAD

Close up of the head control jacks and, the tilt jack and the universal joint that keeps the cutters synchronized.



Gears of the traction driving mechanism which has speeds ranging from 0 to 52 inches per minute. Trimming speed is 30 feet per minute.

Water is again sprayed on the coal as it reaches the top of the conveyor.

This picture shows the sizes of the coal as it is fed into a shuttle car.

machine may pass within a $\frac{1}{4}$" of a timber time after time without touching it. Making a 45 degree crosscut in the 48 inch seam of Upper Freeport coal at Masontown, West Virginia, it produced 3 tons of coal in 45 seconds.

Improvements planned on the production model of the COLMOL include greater streamlining, simplification and shortening of the length of the machine by 4 feet, some inches, to a total length of approximately 20 feet. A flexible conveyor will be installed. These improvements will provide this rugged, powerful machine with greater maneuverability than had ever been anticipated in a machine of this type. Machines built for higher coal will, no doubt, need additional rows of cutters with each row adding to the tonnage it produces. If the 48" COLMOL can produce 4 tons of coal per minute, 3 rows of cutters in larger seams will produce 6 to 8 tons of coal per minute.

To see the COLMOL move steadily and continuously ahead in the solid without vibration, producing a 4 ton flow of coal per minute in a coal seam only 4 feet high, without drilling or shooting, leaves you amazed. To think of the full possibilities of this machine leaves you excited.

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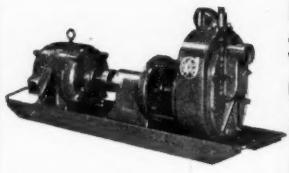

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Recent Procedure To Control Dust In Mine Air

By LELAND H. JOHNSON

Special Engineer, Ventilation and Dust Control, Ore Mines, Tennessee Coal, Iron and Railroad Co., Birmingham, Ala.

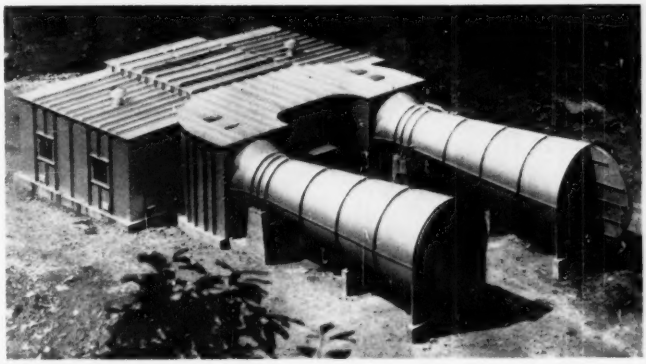
(The material for this paper was derived from 12 years of ventilation and dust control procedures in metal and coal mines while with the Health and Safety Service of the U. S. Bureau of Mines and with private industry in the West. The data in no way reflect the practices and procedures of the Tennessee Coal, Iron and Railroad Company with which I have recently become affiliated.)

The fundamental factors of dust control in the mining industry are not new; however, the application to individual mines or individual districts need variations in detail for doing a thorough job. Dust diseases are becoming more and more a problem for the mining industry, especially so because our mines are going deeper and spreading away from the source of fresh air, because many mines are mechanizing with its subsequent faster generation of dust, and because mine employees are becoming more health conscious than in the past.

The science of dust control has developed in recent years beyond the trial and error stage and many installations and plans in mining and allied industries are well designed and doing a good job.

VENTILATION — One of the most important factors of a control program is ventilation. Metal miners have learned a great deal from coal mining practices in providing sufficient air at the working faces for healthful working conditions. Many mine managements have installed large exhaust surface fans, provided adequate and well maintained intake and return airways, and are coursing the air by means of numerous splits. In metal mines where heavy blasting does not allow for coursing near the active face area, auxiliary blowers with flexible tubing are used to force air within 20 feet of the face.

Many ore mines were dependent on natural ventilation for years. This was a general practice in the years previous to 1938 in most metal mine districts. For instance, in one district, air requirements were such that mechanical methods were needed, and fans of 100,000 to 250,000 c.f.m capacity have been installed as exhaust



Twin Jeffrey exhaust fans at a West Virginia mine. One fan exhausts air while the other stands as emergency unit.

units on the surface. This necessitated large diameter concrete-lined air raises, hundreds of concrete-block walls, cleaning up many falls in airways and required an engineering plan for anticipation of air volume requirements and resistances with relation to mine layouts and projections. Underground booster fans of 50,000 to 90,000 c.f.m. capacity are used where one or more splits require more pressure than that of the total mine pressure.

Present and future ventilation plans consist of multiple entries with double, triple and quadruple headings. Overcasts and undercasts are being constructed to eliminate ventilation doors on haulageways as much as possible. Many auxiliary blowers of 1500 to 6000 c.f.m. capacity with 12 and 18 inch tubing are used.

All phases of wall, door, and overcast or undercast construction are standardized. For instance, wall stoppings for major intake and return airways are constructed from 8" x 12" x 16" concrete blocks and then painted with sodium silicate on the pressure side. Secondary wall are constructed of 8" x 8" x 16" concrete blocks and temporary stoppings are made of either a culled galvanized sheeting or wood. In some mechanical sections, brattice cloth curtains are utilized.

In driving drifts, headings, crosscuts and raises, too much stress cannot be placed on the provision of ample area for the flow of large volumes of air at low velocities. The average area of main airways is probably less than 50 square feet; whereas, they should measure at least 80 square feet. When physical conditions permit, the headings allow for 180 to 200 square feet areas.

Velocities in main airways, from an economical standpoint, do not exceed 800 feet per minute in rough rock sections, 1000 feet per minute in straight timbered sections and 1200 feet per minute in good smooth rock sections. In face regions the velocity of air must be greater than 50 feet per minute to remove the dust fast enough so that employees can breathe air that is not charged too heavily with dust. When velocities greater than 400 feet per minute are sweeping a working face, settled dust is likely to be drawn into the atmosphere along with the dust that is produced. This prevents reduction of dust concentrations.

Use of Water—Various water distribution systems are in use. Their design and installation are based upon the source of the water, the distance from the place of application of the water, the acid content of the water and the proposed time of service that is expected of the system.

In a few instances, water for dust control measures is obtained from fresh-water sources on the surface; the water is conducted in pipes down the shafts or slopes to the active mining faces. This is the ideal system and is recommended when a new mine

is opened or when a completely new dust control system is contemplated. In many instances, water from underground pools or from behind dams placed in drainage ditches can be used. If a thorough search for water is made above and below a dusty section with particular attention to the altitude, a source adequate for dust control will be found.

A body may be found that when piped direct to the face, has sufficient head to maintain enough pressure for efficient wetting; again, a body of water may be found that can be conducted by gravity to a permanent tank near the active workings and then, by using a compressed air tap, enough pressure for efficient spraying may be obtained. When a source of water is below the active workings, a pump already in use may be utilized to pump water direct to the face or to a permanent tank installation. If no pump is available, it will be necessary to install one large enough to conduct the water required for spraying direct to the face, or to a tank from which compressed air will force the water to the place where it is needed. Even small seepages and streams of water with volumes of only one or two gallons a minute have been utilized successfully in small isolated sections where a larger quantity of water was not required.

When dams or reservoirs are contemplated, construction and site should be such that several days supply of water can be held in reserve to take care of a temporary disruption of the intake. Permanent tank installations should be large enough to furnish all the water required for a full shift in the area it is to supply. This could range in size from 100 to 1000 gallons or more.

A portable tank car for distributing water is used only as a last resort, because it has small capacity and requires considerable handling to do a thorough job. It has a place in extremely isolated sections, where no other source of water is available and where it would be difficult or unduly expensive to pipe or pump water. The portable tank car can be elevated so that sufficient pressure can be attained by gravity flow, or a compressed air tap can be connected to the tank to force the water to the face.

In water systems, the aims have been to make the system self-sufficient and to eliminate human manipulation as much as possible. Many valve arrangements, automatic float installations, etc., are well worth the additional "first cost" expense, as wetting methods may soon be abandoned by miners if water is not always available or if any considerable amount of time or effort is required to obtain or to use water. Several companies have found it profitable to place automatic switches or line controls at the face to control pumps, air taps, or some phase of the water distributing system.

A satisfactory water spray nozzle is an important part of a dust control system. Many miners and officials have believed that merely wetting from the end of a hose or pipe and using large amounts of water, constitute satisfactory control. By this method, a working place is made either disagreeably muddy or parts of it are wet unduly and other parts are left dry. A spray nozzle should give a full cone spray, be adaptable for various operations, break the water into a number of minute particles, withstand acid water conditions, stand up under normal underground abuse, and not be excessively costly.

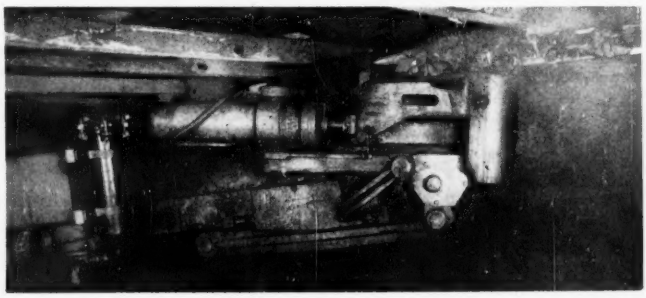
Both plastic and bronze in several sizes have been designed and have given satisfactory results. The cost ranges from 19 cents on the plastic to 48 cents on bronze. Water consumption varies from 1 to 6 gallons per minute and the nozzles work well from pressures of 35 to 100 pounds per square inch. The designs allow for effective wetting from angles of 10 to 60 degrees and distances from 10 to 30 feet.

The combination air water spray is used at some mines and will give the most efficient atomization by passing water through an inner nozzle and compressed air through an outer nozzle. In general, the greater the air to water ratio the finer the mist, but there is a critical figure beyond which very little advantage is gained by further increasing the air consumption. A rule of thumb is used to adjust the mist so that the air feels damp, but not wet, at a distance about five feet from the mist projector. The combination spray has advantages over water alone in that greater spraying distance can be attained, deeper penetration in muck piles is accomplished and is capable of suppressing smaller size particles of dust. The cost of a combination air water spray nozzle is approximately $1.00 each.

Mines that have efficient dust suppression from wetting, require wetting face, roof, walls, and floor before and after blasting, periodic wetting of much piles, sprays installed on cutting and loading equipment, and spray installations at large loading or unloading points. The most effective method to allay dust is to wet at its source. If dust once becomes dispersed in the ventilating current, it is extremely difficult to suppress and may contaminate many working faces on the same split of air.

Dust Determination and Size Characteristics—The maximum allowable concentration of dust containing free silica as listed by the U. S. Public Health Service for 1947 shows 5 million particles per cubic foot of air, standard light field count, for dust containing above 50 per cent free siliva; 20 million for dust containing 5 to 50 per cent; and 50 million for dust containing less than 5 per cent free silica.

The most dangerous dust is said to be that ranging in size from 5 to 0.5 microns or smaller; in other words, the smaller the particles, the greater the danger, and particles of these sizes are too small to be seen by the naked eye. For comparative purposes, fog is in the size range from 5 to 50 microns, 10 times larger than the dangerous dust size, and rain is in the size range from 400 to 5000 microns or about 1000 times larger than the dangerous dust size.



Water spray nozzle on Universal cutting machine is in a Pittsburgh seam mine. Spray water is passed through a cartridge of Compound "M" water softener to make water penetrate fine dust.

The use of the midget impinger apparatus, the microprojector, and in recent years, the midget microprojector, has been adopted as a standard method for sampling dusts, evaluating dust concentrations, and measuring particle size. The methods and principles of this type of sampling and dust determinations have been in use by the Bureau of Mines, the Public Health Service, the American Public Health Association, and others for more than 20 years.

Routine collection of dust samples is necessary to determine borderline cases when it is debatable whether a control system is required. Collection is also necessary in order to have an authentic record for future reference. Even though it can be determined by visual observation whether a working face or piece of equipment needs to be controlled, sampling provides the only positive record of conditions.

After 21 years of experimentation and observation, the following conclusions have been reached regarding silicosis and the recent procedures to control dust in mine air:

1. So far as known at present, silica dust apparently is the most harmful of the dusts ordinarily encountered. Silicosis, the disease caused by breathing silica dust, is a widespread industrial hazard that is increasing and affects appreciably the death rate among mining and industrial workers exposed.

2. Silicosis is characterized by fibrotic changes in the lungs which are said to be more clearly noticeable and easier to diagnose than changes due to other dust diseases of the lungs. The dust of free silica is considered because the victims are thought to be more liable to contract tuberculosis than persons exposed to nonsiliceous dusts.

3. No cure is known at present for silicosis; therefore, prevention appears to be the best remedy. The Council on Industrial Health and the Council on Pharmacy and Chemistry of the American Medical Association made the following report on the use of aluminum in the prevention and treatment of silicosis in April, 1946:

"The dissemination of reports on the effects of aluminum powder in the prevention and treatment of silicosis has aroused widespread interest and a demand for an authoritative statement regarding its value. At the present time the following statement would seem to be warranted; it is subject, however, to such modification as future knowledge and experience may indicate.

"(a) In experimental animals the prophylactic use of aluminum inhabits the toxic action of relatively pure quartz.

"(b) In man, industrial dust exposures often involves mixtures of various minerals in addition to quartz, but other environmental variables to which experimental animals are not subject. Therefore, human silicosis usually develops more slowly and is often modified in type. Only prolonged unbiased observation with adequate control cases, will demonstrate whether the prophylactic results obtained with animals are applicable to man.

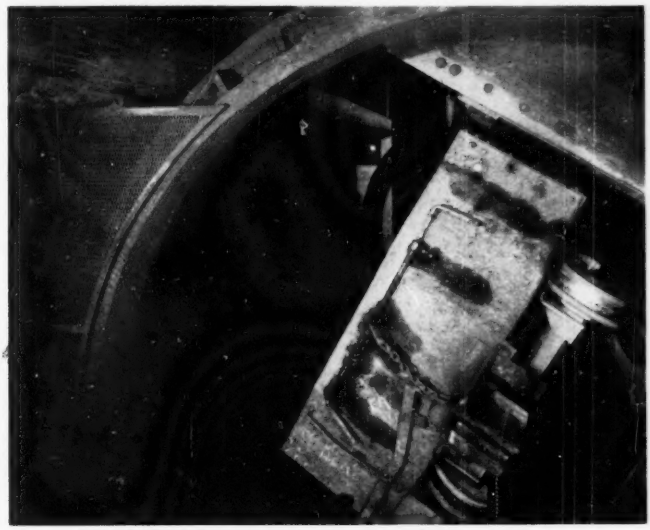
"(c) Animal experiments have demonstrated that administration of high concentrations of amorphous hydrated alumina unfavorably influences resistance to tuberculosis. While this result has not yet been reported for metallic aluminum, caution in the application of all aluminum therapy to human beings is recommended.

"(d) The use of aluminum might appear as an easy short cut to healthful working conditions, thus, saving large expenditures for ventilation and other control methods. Actually there is no substitute for the accepted methods of dust control.

"(e) If the industry indiscriminately treats all employees with aluminum dust, there may be aggravation of tuberculosis or other pulmonary conditions.

"(f) The therapeutic use of aluminum in man appears to relieve symptoms in a very small number of cases in which silicosis develops rapidly. Experience in some groups is more favorable than in others.

"(g) In view of these conditions, it is recommended that the general application of aluminum therapy in industry be delayed until adequately and impartially controlled clinical observation demonstrates its effectiveness in preventing or alleviating silicosis in man. In the meantime, there should be no slackening in the control measures that have been found effective in reducing the incidence of dust disease in industry.



Water spray nozzles in rotary dump. Fluid Compound "M" water softener is added in this installation.

4. Controlled ventilation with ample sized airways, substantial wall stoppings, use of overcasts and undercasts, auxiliary blowers, etc., is a very important phase of a dust control program in many mines. Dust will remain suspended in still air for hours, and positive air movement is necessary to sweep it from the affected areas. Ample ventilation is a must at many mines to control high temperature and humidity and remove toxic and harmful gases that contribute to respiratory disease.

5. All drilling, cutting and loading machines are usually of the wet type. The most efficient drilling ma-

chines are the side-exhaust port type and equipped with the New York backload. Cutting machines are equipped with a water spray on the intaking bits, also a full cone spray on the return side and loading machines are equipped with fan or full cone sprays. The use of tungsten carbide bits on drilling and cutting machines aids in dust suppression, as the longer a bit remains sharp, the larger are the cuttings and the smaller the amount of fine dust that is generated. It was observed that cutting is speeded by the lubricating and cooling action of water on the bits.

6. A vigorous effort is being made to keep roadways and travelways reasonably free of pulverized material such as coal, ore, rock and traction sand. Good housekeeping helps to reduce concentration of dust produced by haulage and passage of employees, as well as the number of injuries from stumbling and falling. Some mining companies have water tank cars equipped with sprays to wet down main haulageways at weekly intervals.

7. A hose normally ¾ inch in diameter and 25 to 50 feet in length is available at each working place with the valve convenient so that the men do not have to walk far to reach it.

8. Water distribution systems have reduced (and sometimes eliminated entirely) the hazard from fumes generated by detonated explosives. Such gases as oxides of nitrogen and hydrogen sulfide are readily soluble in water. A water spray may cause additional ventilation to move methane and carbon monoxide from a working face.

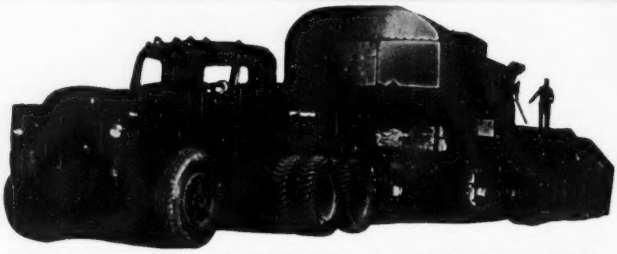
10. Visibility tests have not been made, but it was definitely observed that illumination is greatly improved, possibly as much as 75 per cent where water is used compared with instances where no wetting is done. The ability to observe roof conditions is important in mining, and water systems make it possible for miners to note bad roof conditions more readily than where dust is in the air or covers the roof surfaces.

11. Many companies are conducting periodic physical examinations, including X-raying the chests of employees. In this way, a close check is maintained on each individual, and if anyone shows signs of developing silicosis, his work can be changed before he becomes incapicitated.

12. Routine measurements of the effectiveness of dust control program by means of dust sampling, counting, analyzing, air measurements and pressure tests is being done because of frequent variations in mining practices, structure of ore or coal, and ventilation changes. These data are also necessary in order to have an authentic record for future reference.

13. Respirators are worn only as a last resort for protection in dusty atmosphere. Every effort is first made to suppress or remove the dust at its source or to remove or isolate or allay the agency that creates the dust. After a conscientious engineering effort has failed to reduce, remove, or allay the dust that is produced, then respirators are suggested for the protection of exposed individuals. Both management and employees need education in the care and maintenance of respirators when they must be utilized.

14. In general, management in the mining industry is fairly well convinced as to the desirability of dust control. Some employees are somewhat hesitant as to dust control procedures at first but soon will take every advantage of available measures to protect themselves against respiratory trouble.



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Left to right: J. T. Ryan, Chairman, Entertainment Committee; Dr. L. E. Young, Consulting Mining Engineer; M. L. Coulter, Asst. to Vice-President, Clearfield Bituminous Coal Corp.

J. L. Donahue, Sales Manager, Mine Safety Appliance Company and President of the Institute for 1948.

Harry M. Moses, President, H. C. Frick Coke Company and principal speaker of the evening.

G. A. Shoemaker, President, Pittsburgh Consolidation Coal Company, Library, Pa.; J. L. Hamilton, Manager, Northern Mines, Republic Steel Corp. and W. J. Fene, Asst. Chief Health, Bureau of Mines, Washington, D. C.

Dr. J. J. Rutledge, Chief Engineer, Department Mines, State of Maryland and J. M. Lowe, Secretary of the Institute.

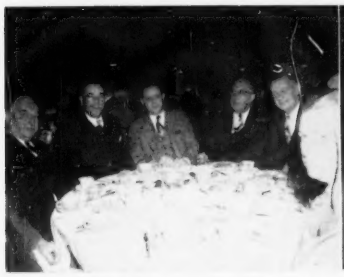
The Coal Mining Institute Of America Holds 62nd Annual Meeting

The 62nd Annual Meeting of the Coal Mining Institute of America was held in the Fort Pitt Hotel, Pittsburgh, Pennsylvania, December 9 and 10. Mr. J. L. Hamilton, Manager Northern Mines of the Republic Steel Corporation Corp. was elected President for 1949. New Vice-Presidents of the Institute are: G. A. Shoemaker, President, Pittsburgh Consolidation Coal Co., M. L. Coulter, Assistant to the Vice-President, Clearfield Bituminous Coal Corp., and Dennis Keenan, State Mine Inspector, Barnesboro, Pa. New Managing Directors are: G. W. Grove, U. S. Bureau of Mines, J. J. Snure, Rochester-Pittsburgh Coal Co., P. T. Latta, Crucible Fuel Co., G. H. Sambrook, H. C. Frick Coke Co., J. Allen Brookes, Manager, Mather Collieries Co., J. M. Lowe of the Hillman Coal & Coke Co. was re-elected Secretary.

The principle speaker of the evening was Harry M. Moses, President, H. C. Frick Coke Co., who presented a very timely and important paper to the more 700 key men in the coal producing industry. Believing that every word of Harry Moses paper should be read by every man connected with the coal industry, we are publishing this paper in its entirety.

THE STATE OF THE INDUSTRY

As the year 1948 draws to a close, it is apparent that the bituminous coal industry in the United States will again record a production in the neighborhood of six hundred million tons. It is a credit to all those who are engaged in the industry that during the past decade an amazing production record has been consistently maintained, in spite of the convulsions which the industry has experienced. This great industry of ours has an enormous vitality, otherwise, it would not have withstood the many crises that have confronted it: and our problems of production would not have been solved. I think we all recognize that, regardless of the complexity of our problems, they are all related to and ultimately controlled by a basic economic force, the force that is generated by the human urge which makes men willing to devote their labor to the production of goods having an exchange value for exchange medium, or goods they desire which are produced by other men. When we reach the point where other men are not willing to exchange, or are not able to exchange their goods with us, the usefulness of our industry has gone. Many people in the industry are now expressing concern over the possibility of a market collapse, with resultant overproduction and financial stringency. If our customers reach a point where they are bankrupt and cannot buy our product, there is not much we can do about that, but where their



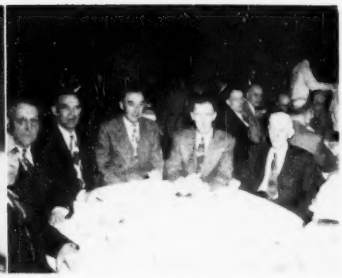
Seated at this table are: W. H. Turner, Asst. Vice Pres.; T. J. Pisula, Asst. Gen. Mgr.; George Acke, Supt.; J. A. Boyle, Chief Mine Inspector; C. F. Davis, Safety Director; T. L. Mullan, Mgr. Ind. Relations; John Rekus, Plant Protection, Gene Ruch, Chief Casualty Dept.; Albert Klook, Mine. For.

F. Malcolm Graff, Hulburt Oil & Grease Co.; G. A. Lamb, Pittsburgh Consolidation Coal Co.; E. W. Wanner and O. A. Schwanke, Hulbert Oil & Grease Co.; T. W. McMillen and C. E. Berner, Penna. Rating Bureau.

Frank Dunbar, Retired; S. R. McBride, Rudy Mackensen, Henry Rose, A. B. Cunningham, all of the Pittsburgh Consolidation Coal Co.

Left to right: H. W. Galinat, Mech. Eng.; R. L. Llewellyn, Prep. Eng.; W. D. Meakin, Ventl. Eng.; J. Holliday, Eng. all of E. G. & F. A.; Walter A. Smith, Vice-Pres., Irwin Fdry. & Mine Car Co.; P. H. Shoener, Lub. Eng., Cities Service Oil Co.; Lee Albacker and H. E. Hart, Crucible Fuel Co. and E. E. Bracken, Eng. Draftsman, E. G. & F. A.

Harry W. Weaver, Safety Eng., Coal Operators Casualty Co.; J. C. Schrecengost, Chief Eng.; Dario Parisi, Supt.; L. E. Anderson,; W. R. Woodall, Gen. Supt. all of the Allegheny River Mining Co.



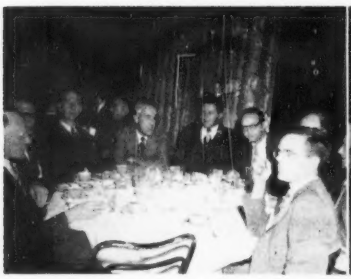
Left to right: Geo. Steinhouser, State Mine Inspector; J. T. Clark, Div. Mgr., Pittsburgh Consolidated Coal Co.; Wm. J. Ivill, State Mine Inspector; Wm. Goziou, Thomas Jones and Thomas Prosser all of the Bethlehem Collieries, Marriana, Pa.

inability to use our product is the result of high prices or poof quality, that problem is ours and requires solution.

The real employer is the user of our product, and if we expect him to continue using it, we—and we alone—must make it possible. We cannot forecast the price level that will be required to keep his business, so we must proceed on the general theory that our markets will be best protected and expanded through an abundant supply of a high quality product at the most reasonable price level we can attain. That necessity can be met only through our efforts to maintain and increase efficiency in our production methods, whereby a greater output per man and a related lower unit cost will be achieved. During periods of unlimited production demand, such as we have experienced over the past nearly ten years, it is inevitable that basic changes will occur in the pattern of our industry. When the "lush' market is gone, and the period of "shakedown" arrives, which in our industry may well be now, we find that these changes must be considered as having permanency in the future scheme of things.

In recent years we have witnessed a transition from a face-to-face workday to a portal-to-portal workday, the payment of wages for lunch time, the establishment of an industry-wide welfare and retirement fund, the establishment of a mine safety program under a wage agreement that makes a Federal Mine Safety Code enforceable by contract, and the establishment of national industry-wide wage agreements. Our payrolls have increased 266.8 per cent since 1939, even though our present level of production is only 56 per cent over our 1935-1939 level. There may be those of you who do not believe that these transitions are permanent, and a look back through the years may inspire the hope for a possible restoration of some of the practices of "the good old days" as relief from present increased costs. In my humble opinion, you are just "wishfully thinking" for a circumstance that will not transpire, at least not during our active lifetime.

If we expect to create a favorable cost and quality level that makes it possible to retain and expand our markets, we must offset our increased costs, so far as we can, by a continuous, vast investment of capital, at constantly increasing price levels, for new plants, new machinery, and new processes for the production and beneficiation of coal as rapidly as the technicians of our industry can develop them. This poses the problems as to whether or not the money will be available for this advancement, or whether a long outmoded and completely Mid-Victorian governmental tax policy, as applied to depreciation reserves and profits, will continue to limit our research and modernization programs to the end that the industry will stagnate and return to its traditional policy of doing the best it can with what it has, and thus return to the chaotic condition in which the coal industry found itself in 1939. This need of tax revision exists in every industry, but in none is it so necessary as in ours. There are some who feel that the economic requirements of the industry can be fully



Left to right: G. D. Wyant, Supt; W. P. Shrum, Asst. Mech. Eng.; C. R. Weihe, Mech. Eng.; J. R. McWicker, Mining Eng; G. E. DeRushi, Field Eng.; J. W. Sembower, Draftsman; F. J. Reed, Chief Eng.; G. L. Bolander, Electrical Eng., and J. S. Neill, Industrial Eng. All of the Mining Dept. Republic Steel Corp.

Thos. W. Glasgow, W. H. Glasgow, Jr., W. H. Glasgow, Sr., Coal Operators; E. E. Quonon, Bureau of Mines, C. W. Thompson, Weirton Steel Corp. and H. C. Howarth, Bureau of Mines.

Paul W. Graff, President, Westmoreland Mining Company; E. E. Balduf Sales Eng., Coal Preparation, Jeffrey Mfg. Co. and Frank Coleman, Gen. Mgr. Westmoreland Mining Co.

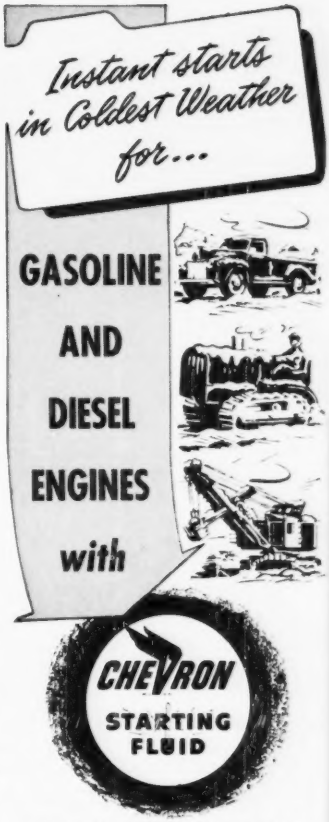
met by restricting production to a level that is lower than demand. That philosophy reflects a defeatism that will restrict and dry up markets which are encouraged by an abundant supply of a high quality, low price product. In my opinion, any attempt to interrupt the free flow of commerce in our industry by a restriction of production by any means will be a backward step that can only impose hardship on every segment of the industry. This theory must be considered in close relation with my preceding remarks on the bad effects of present tax methods, in that limits the productive capacity of invested capital to something less than full efficiency. The end result would be an increased cost to the consumer, plus, in a diversified industry such as ours, extensive additional capital outlay for the necessary capacity for a particular type and usage of coal, while other capacity stands idle.

The experience of recent years has adequately demonstrated that bituminous coal is among the most important, if not *the* most important, product in our national economy. Industry and transportation are so dependent upon coal that a failure in its supply would bring about a complete collapse of our industrial economy. As a source of energy it is still supreme, as it will continue to be for many years to come, and even though the industry today is experiencing competition from petroleum, natural gas, and hydro-generated electricity, the bulk of our energy demand must still be supplied by coal. In the long run, I feel that the coal industry can overcome its competition if, under a progressive leadership, its markets are developed through a sincere effort to serve the needs of the user of our product.

In addition to the economic factors that run to the benefit of our customers, we have internal problems within the industry which must be dealt with. The problem of mine safety is a good example. Every progressive segment of the industry has joined in the common effort to improve mine safety over a long period of years, and the contributions of the many farsighted men of the industry to this cause are too numerous to mention here. We have made progress, it is true, but we must make more progress. One of the discouraging things to those who have spent their time and talents in the promotion of mine safety has been that when criticism is leveled at the industry over mine safety, it generally flows from the experiences of those in the industry who have not been progressive in promoting or maintaining a high degree of mine safety. The Federal Mine Safety Code, which is now a part of the National Bituminous Coal Wage Agreement, should do much toward the elimination of hazard in the type of mining operation that shows little regard for mine safety. It is my opinion that the present Code is only a start, and that subsequent revisions will make its provisions more stringent. We hear much these days about the possibility of legislation that would give to the Federal Mine Inspectors a legal authority to enforce compliance with the Code. Should this transpire, the impact upon the industry would be substantial. Most of us prefer inspection police power left in the agents of the various states, but we must recognize that we now have a very undesirable situation in that Federal mine inspectors have no responsibility for the results that flow from the enforcement of their recommendations. It is only reasonable to presume that a greater responsibility on the part of Federal mine inspectors could result in a closer scrutiny of the circumstances on which recommendations are made. The present trend cannot be ignored and should receive the consideration of our best thinking.

The major internal problem which we have is that of our relations with the United Mine Workers of America. There is no need to review the bitter controversies that have attended our negotiations with the Union over the past sixteen years. Suffice to say that they have been bitter. They have subjected leading figures among the producers to undeserved scorn and bitter castigation. They have resulted in criminal prosecutions on both sides, attendant convictions, and the seething resentment which always follows these tactics. These resentments fanned into flame repeatedly and continuously have almost completely destroyed the mutual confidence between the two groups, and the mutual purpose of our relationship has been submerged in a welter of clashing personalities. As I look down the road, I cannot see the solution of many of the problems which will face the industry unless our relationship with the United Mine Workers of America improves to the point where the necessary degree of mutual confidence is brought about. Under the type of industry-wide relations that prevails within our industry, we must deal with all kinds of men—

(Continued on Page 37)



CHEVRON STARTING FLUID developed in Alaskan wartime research has started Diesel engines in less than 10 seconds at 50 below zero. Supplied in capsules for use with special applicators it insures safe, fast starts.

CHEVRON STARTING FLUID is inexpensive and easy to use. It lubricates as it starts the engine and won't corrode metal parts.

Approved by the makers of over 95% of America's installed Diesel power

RPM DELO Oil's outstanding performance in all types of Diesel equipment is due to its all-around protection of every danger spot. "RPM DELO" gently removes carbon particles and other dirt that clog your engine and rob it of power . . . encases them in a protective film to drain away when the oil is changed.

DIESEL ENGINE RPM DELO LUBRICATING OIL

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"Caterpillar" Scraper being pusher loaded with "Caterpillar" Diesel D8 and D7 Tractors. Stripping and loading coal near Birmingham, Alabama for the McCullough Industries.

"Caterpillar" Diesel D7 Tractor with No. 7S Bulldozer stripping coal for the McCullough Industries near Birmingham, Alabama.

Coal Is Stripped In Alabama Too

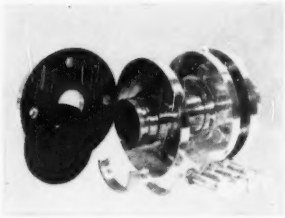
"Caterpillar" Diesel D7 Tractor with Trackson Traxcavator loading coal near Birmingham, Alabama for the McCullough Industries. These units handle an average of 900 tons per day.

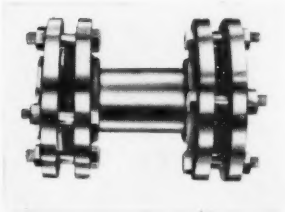
New Equipment

NEW EASY-TO-INSTALL JOINT FOR LINED PIPE

A new pipe joint that reduces the cost of installing and repairing rubber-lined pipe by as much as 50% has just been announced by the Gates Engineering Company, New Castle, Delaware.

Called the Gaco Joint, the new device completely eliminates these expensive steps which are normally encountered in lined pipe installations: 1. No detailed layout plans are needed—lined pipe may be bought in sections, cut and installed right on the job. 2. Welded fittings are eliminated—pipe is cut, grooved, bored and counterbored with special machine (or regular pipe machine equipped with adapter), rubber inserts are slipped into place, flanges are bolted together—joints are



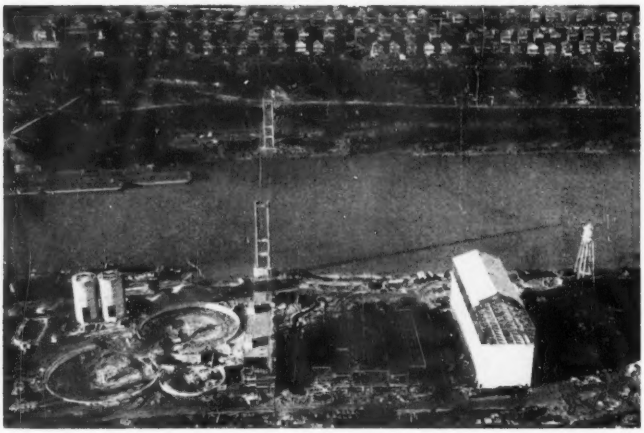


complete in 2 minutes. 3. By keeping a supply of joints in stock, repairs can be made on the spot by *plant maintenance crews*—shutdowns last minutes instead of days.

Gaco Joints are available in 1½" to 4" pipe sizes as 45° ells, 90° ells, Y's, Tees and separate flange kits for connecting straight lengths. Kit for adapting user's pipe machine is available at a nominal cost, while special machine may be bought or leased. Complete information may be had by writing Gates Engineering Company, New Castle Avenue, New Castle, Delaware.

J. Robert Bazley, of Pottsville, Pa., has a variety of equipment working on the operation, which started two years ago. 27 Euclid trucks, 10 Sterling trucks, 1 Lima 2½-yd. shovel, 1 Lorain loading shovel, a 15-yd. Marion dragline, 3 Super C Tournapulls and a LaPlant-Choate TS-300 Motor Scraper which is stripping topsoil and overburden down 10' where the shovels and Euclids take over to strip to the rock ledge running over the coal. When the scrapers have stripped far enough ahead, the TS-300 is loaded with the shovel. The round trip on the haul road is nearly a mile long with a 3% grade. The fill rises some 75 to 100 feet above the stripping operation and is being leveled as work progresses.

A few miles north of Kylertown, Pa., Robert Bailey of Morrisdale, Pa. is stripping overburden from a 3-ft. vein of coal. The efficiency run operation covers many acres and ton after ton of coal streams from the mines daily. The stripping work employs 2 TS-300 LaPlant-Choate Motor Scrapers. The scrapers strip down some 30' to within 3' of the coal vein. The shovel then cleans the remaining overburden with trucks and Motor Scrapers hauling the material to old cuts where spreads are made evenly and quickly.



WORLD'S LARGEST COAL PLANT TAKES SHAPE

Aerial view of $12,000,000 coal proportion plant — largest in the world—F. H. McGraw & Company is building for Jones & Laughlin Steel Corporation at East Fredericktown, Pa. This plant, one of the most economically important structures ever to be built in the industrial east, will be completed by mid-summer and will process 2000 tons of coal an hour from the combined Vesta Four and Five mines, separating it from refuse, sizing it, then diverting high grade coking coal as well as steam coal to waiting river barges.

Coal and steel experts claim the new plant will build up dwindling supplies of high grade (low sulphur content) coking coal and subsequently enable steel mills to produce more and better steel. Coal and steel authorities in other sections of the country are watching the plant's development with considerable interest.

Major factor in the operation of the plant will be a thousand-foot suspension bridge, similar in design to the George Washington, across the Monongahela River, over which the coal will be carried on a conveyor belt from mine to plant. To prevent coal from freezing as it crosses the bridge, during severe winter weather, a Quonset-type cover will extend the length of the bridge, making it the longest covered bridge in the world. Work on the bridge is nearing completion.

Working a six-day week, McGraw engineers and construction crews, under the supervision of Francis J. Tytus, F. H. McGraw vice president, are rushing the gigantic project to completion. With most of the plant's 10 buildings erected or partly erected, principal job ahead is that of electrical work (there will be 220 miles of wire in the plant and 65 miles of conduit) and installation of coal processing equipment machinery.

Storage— one of the most important phases of coal handling—is the subject intelligently discussed and attractively illustrated in a bulletin entitled "Storage of Coal," just released by the division of engineering and research of The Ohio Coal Association.

The bulletin contains the best information available on the preferred procedure of storing coal. Factors which contribute to storage pile hazards—long a threat to power plant owners and operators—are outlined, and methods of storing which guard against these hazards are clearly explained.

Illustrations show the equipment recommended for a successful stock-piling program. In simple, understandable terms, the text points out steps to be followed in efficient, profitable coal storage.

The Ohio Coal Association was formed for the purpose of promoting activities in the best interests of Ohios coal industry. The engineering and research department prepares and disseminates technical information on Ohio coal and industrial combustion equipment.

The engineering and research division is at present releasing a series of bulletins on domestic coal heating, which are designed to help retail coal dealers with their coal service problems, build sound, profitable business, and help customers get the most for their fuel dollars. Copies of these bulletins may be obtained free by writing to The Ohio Coal Association, 705 Rockefeller Building, Cleveland, Ohio.

A price list of Industrial Carbon Brushes is available at the Standard Carbon Company, Steubenville, Ohio. This price list includes prices on Carbon, Graphite and Metal Graphite Brushes as applied to Generators, Motors, Rotary Converters and Auxiliary Equipment. It also gives prices on Self Lubricating Bearings. Copies of this price list can be had by writing direct to the Manufacturer or to COAL MINING.

. . . Everything The Coal Stripper Needs

Dragline Buckets and Parts
Spiral Welded Pipe
Wire Rope Slings
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In short, just about ANYTHING the Stripper Needs.

We maintain our own warehouse and make prompt delivery on ALL items

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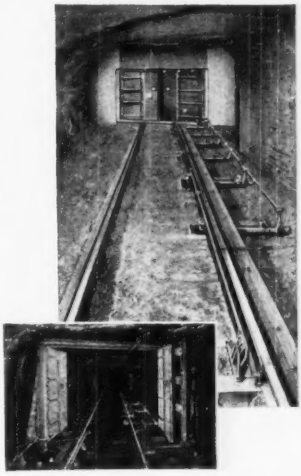
More Air Where Wanted . . . Less Gas . . . Safety

With "Canton" Automatic Doors!



Engineered flow of air sweeps out gas pockets, and air flow must be continuous, reliably directed by "Canton" Automatic Doors. Dissipating explosive air is one important function. Providing healthy, breathable air is another function that steps up productivity of every worker. Eliminating that trapper boy accident is another.

Insurance against accidents, increased haulage, continued speed ahead with "Canton" Automatic Doors make it imperative that every mine owner and manager investigate the economy proven by a quarter century of American Mine Door service.

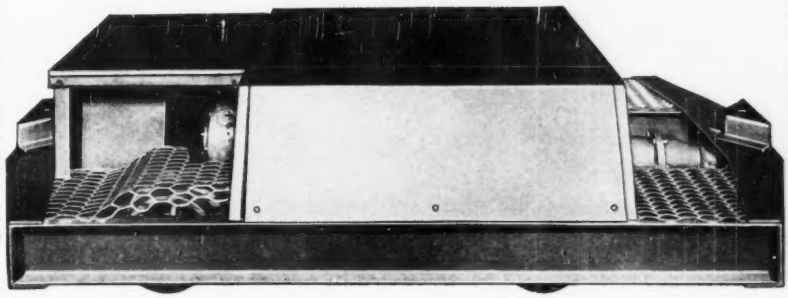
Any doors in the ventilating system of a mine should be Canton Automatic Doors.

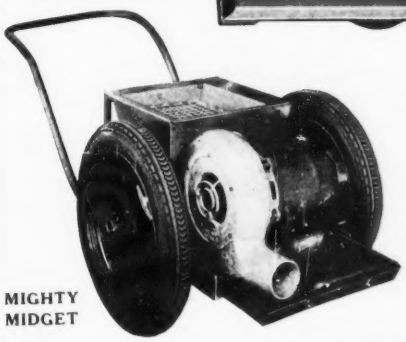
"CANTON" DOORS ARE SELF LIQUIDATING IN A SHORT PERIOD

Note the photos . . . when the oncoming train rides the trip levers . . . flip, the doors open; when the last car passes . . . release, the doors spring shut . . . positive action and reaction . . . all mechanical in split seconds. Complete literature sent on request, engineering advice given without obligation. When writing, please use street and zone number.

DUSTributors Protect hundreds of lives and dollars every day . . .

This MIGHTY MIDGET machine does a WHALE of of job. Dustributes 34 lbs. of dust per minute and has averaged a ton per hour for a full shift. Overall length, 45"; height, 18½". Motor, 2 hp, 3450 rpm. Hopper capacity, 1 sack 80 lbs. Net weight 280 lbs. Static pressure, 11.4". Can be transported on conveyor, in coal car, shuttle car or special-built cart. Write for demonstration.





MIGHTY MIDGET

You never hear of the mines which operate safely, year in, year out, 70% rock dust "saturate" with coal dust won't explode. Dustributors "saturate"! In a performance test the Dustmaster has distributed 276 pounds per minute and 2 car loads, 100 tons in 3 shifts. Canton Dustmasters are rigidly built for hard service and low maintenance cost. Specially designed to develop high pressure for dusting distant and "hard to reach" parts of the mine, as well as entries and rooms. Mechanical safeguards protect all vital units and movable parts, give safety protection against accidents. With 500 feet of hose, it is possible to dust 1,000 feet of airways from one point on track. When writing for complete descriptive catalogues, please use street and zone numbers.

American Mine Door Company

"Dustributors", Automatic Switch Throws, Safety Signal Systems, Mechanical Car-transfers

2059 DUEBER AVE. CANTON 6, OHIO

Formation of a special mining division to promote the use of Rustrem anti-rust paint by coal operators, is announced by Speco, Inc., Cleveland.

Rustrem (Rust Remedy), according to the manufacturer, can be applied right over rust without wire brushing, scraping or sand blasting. It penetrates the rust layer, renders it inactive and seals the surface against further rust action. It can also be applied with good results on moist surfaces, a feature which makes it particularly adaptable to mine work.

The paint is reputed to adhere tightly regardless of surface expansion or contraction resulting from temperature changes. It is unaffected by moist or fume-laden air, sulphur, mild acids or alkalis. Large quantities are now employed in marine work and it is recommended for underwater use in mines. Tests indicate that Rustrem lasts 10 to 20 times longer than ordinary paint in locations subject to intense rust action.

Rustrem can be applied by either brush or spray. It is available in black and aluminum and dries to a glossy, attractive finish. Because of its penetrating and scaling action, Rustrem should not be painted over as it will bleed through ordinary paints.

A few of the many typical mine locations on which Rustrem is used regularly are tipples, mine cars, all

machinery, metal roofs, trucks, piping, etc. A one quart sample can will be sent postpaid to mine operators who wish to try it on their jobs under actual working conditions. This is in keeping with the established Speco "try before you buy" policy.

For free sample, write to G. F. Foster, manager, mining division, Speco, Inc., 7308 Associate Avenue, Cleveland 9, Ohio.

Equipment of Bailey Construction Company Stripping in Clearfield County, Penna.

The New
S & A
FULL BEARING
DRAG LINE CHAIN
a "MUST" for Strippers

Made of alloyed steel, all links poured at one time from one heat of steel. A chain of uniform analysis and heat treatment. Strong and durable — low cost — quick delivery.

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• FOR SALE •
DEEP MINE

Located on main line of I. C. C. R. R. in Southern Illinois. 6,000,000 tons of No. 6 Illinois coal under long lease. Mine is well equipped mechanically with Joy loaders, etc. Excellent market. Reasonable terms—unusual reason for selling.

Phone Fieldbrook 1062
Pittsburgh, Pa.

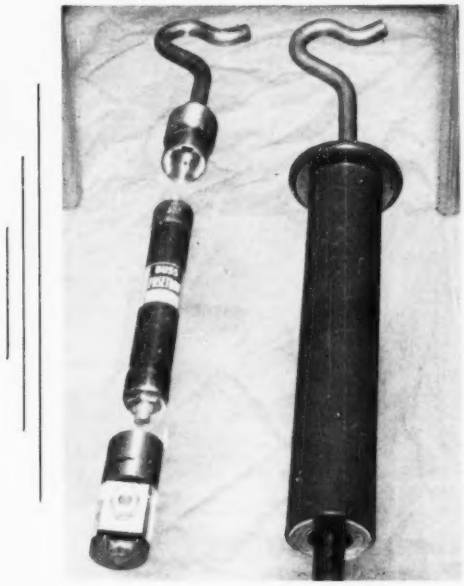
Appointment of Fred M. Carothers as district sales engineer with headquarters in Meadville is announced by Highway Equipment Co., Pittsburgh.

Prior to joining Highway, Mr. Carothers was district representative for Drott Manufacturing Corp., Milwaukee, traveling 14 eastern states. His equipment experience also includes service with the Oliver Corp. Before entering the equipment field, he was affiliated with Westmoreland County Department of Roads and Bridges, Pennsylvania Department of Highways, Pennsylvania Turnpike Commission and several construction firms.

The Buda Company of Harvey, Ill., makers of the famous Buda engines, announce the appointment of The Brinker Supply Company of Pittsburgh as distributors of the new Buda drill for 23 counties in Pennsylvania.

The new Buda Vertical Drill in use on coal stripping project of Jefferson Coal & Coke Company near Burgettstown, Pa.

To quote Mr. Fred Brinker, General Manager of the Brinker Supply Company: "Buda Earth Drill Model H. L. B., is being used with excellent results in the coal stripping fields." It is a speedy and efficient way to put down a deep hole of 25 to 100 feet." "Augurs may be hauled up in 20 ft. lifts; the hydraulic retraction of the entire life enables complete drilling and sampling without moving truck; diesel or gasoline powered."



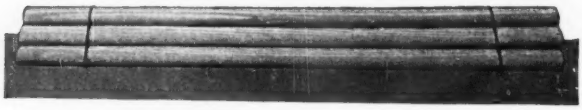
LATEST MESCO TROLLEY TAP

Catalog Number 1051

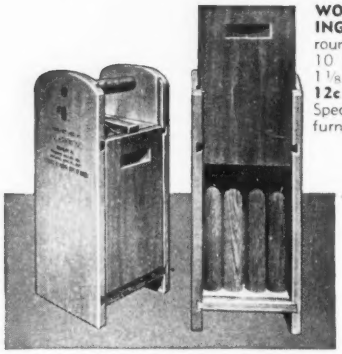
The latest Mesco trolley tap gives almost solid path of power from trolley hook to machine. Made to accommodate standard trolley tap fuse, a fusetron with threaded stud end, or standard one time trolley tap fuse with stud on either end. Threaded stud on fusetron or fuse, makes the almost solid connection between hook end fuse holder and cable end fuse holder, eliminating burning of the fuse in loose ferrule type connection.

This new feature not only makes a better electrical connection but increases the strength of the entire trolley tap.

MOSEBACH ELECTRIC & SUPPLY CO.
1115 ARLINGTON AVE. PITTSBURGH 3, PA.
Phone: Hemlock 8332



HAMMOND'S BLASTING EQUIPMENT



WOOD TAMPING POLES FOR TAMPING EXPLOSIVE SHOTS: Poles are round made of hardwoods, lengths to 10 ft. Price per lineal ft. 1" dia. **6¢**. 1⅛" dia. **9¢**. 1¼" dia. **10¢**., 1⅜" dia **12¢**., 1½" dia. **14¢**., 1¾" dia. **20¢** Special diameters and lengths can be furnished.

EXPLOSIVE BOXES: Made entirely of wood having no metal parts, tongue-grooved and dovetailed construction with automatic lock using a rubber band for a spring, treated with paraffin to make moisture resistant "Approved by the Pennsylvania Department of Mines." Sizes as listed based on 1¼" x 8" sticks.

No. 9 Powder Box	$ 2.05	Each	No. 50 Powder Box	$ 6.40	Each
No. 12 Powder Box	$ 2.40	"	No. 72 Powder Box	$ 7.50	"
No. 16 Powder Box	$ 2.85	"	No. 90 Powder Box	$ 8.40	"
No. 20 Powder Box	$ 3.10	"	No. 6 Cap Box Sizes 2½" x 3" x 6" Inside	$ 1.70	"
No. 25 Powder Box	$ 4.20	"	No. 8 Cap Box Sizes 2" x 2½" x 8" Inside	$ 1.70	"
No. 36 Powder Box	$ 5.30	"			

The above boxes are rigid and non-conductive.

J. V. Hammond Company **Spangler, Pennsylvania**

INCREASE YOUR PRODUCTION
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DALY'S IMPROVED COMBINATION MINE CHECK
The Only Satisfactory Check on the Market Today
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The flexible coupling for all types of pipe.
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KNOW THAT ARROW SERVICE MEANS
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PARIS Horizontal & Vertical Drills
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WICKWIRE-SPENCER - Wire Rope
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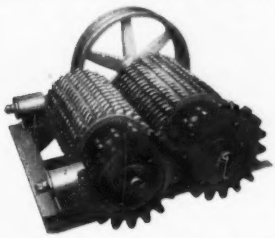
7½ KVA Generators
(AC-120 V., 3 Phase,60 Cycle, Gas Engine, New Perfect)
$1,150.00 value for $595.00

10 Ton Chain Hoists
New, Spur-Geared, With Swivel Hook
$560.00 value for $275.00

4 in. I. D. Suction Hose
Heavy Duty, 10 Ft. Lengths, Complete With Couplings, New
$35.00 value for $17.50 each

M. BERGER & CO.
Pittsburgh Terminal Warehouse
Pittsburgh 19, Pa.
EV. 7577 EV. 2488

A bulletin THE DOUBLE ROLL CRUSHER ASSURES UNIFORM PRODUCT has just been released by the Scottdale Machine, Foundry & Construction Company, Scottdale, Penna. It shows the Model Numbers of 42 and 63 hook tooth design of crusher, the hook tooth being so ar-



ranged on each roll that when the rolls are assembled in their staggered position they produce a shredding action on coal and give a better uniform product with less power consumption. Heights, base sizes, product sizes, tonnages per hour, maximum hp speeds, sizes of motors, sizes of flywheels and complete weights of the two sizes of crushers are given.

Drill Hard Ground

LIMESTONE
SANDSTONE
SHALE

FAST

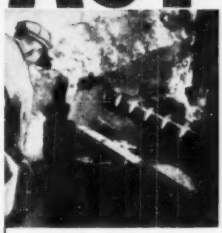
Kennametal Finger Bits provide greater speed, more shock and jolt absorbing power in hard ground. They give you the strength and durability in tough ground to keep your job on the move.

Kennametal Finger Bits are built with a cutting surface of solid Kennametal cemented carbide . . . that takes tough punishment, stays sharp longer, and saves money on bit changing cost on every job you do.

Drilled footage can be increased 50 per cent or more because you maintain a sharp cutting edge. Drilling costs are decreased because Kennametal is dependable . . . it helps you handle nearly every type of ground, keeps your job moving at a faster pace, and makes big gains in footage drilled.

Bits fit conventional drill heads. They are available in six standard sizes.

Folder FS-2 gives full particulars. Write for it today. Mining Division, Kennametal Inc., Latrobe, Pa.



"20 feet of tough, hard sandstone drilled per change of Kennametal Bits where drilling could not be done with any other rotary bit."
Butler Co., Pa.

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THE WORLD'S LARGEST MANUFACTURER OF CEMENTED CARBIDE MINING TOOLS

TROLLEY SLIDER

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OUR SPECIALTY—TESTING BITUMINOUS COAL LANDS
SATISFACTORY CORES GUARANTEED

The Buda Earth Drill, Model H.L.B., on coal stripping job of Jefferson Coal & Coke Co. near Burgettstown, Pa.

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MODEL H. L. B.

The drill that Coal Strippers have been waiting for!

A speedy and efficient way to put down holes of 25 to 100 feet. Augurs may be hauled up in 20 ft. lifts; hydraulic retraction of the entire lift enables complete sampling and drilling without moving truck.

Diesel or gasoline powered.

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MOVERS of Coal Stripping and Contractor's Equipment

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60 *Femco* TROLLEY-PHONES

installed in mines in the past month

CONSTANT SUPERVISORY CONTROL
through
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from mine-mouth to face...

INCREASES TONNAGE
Pays for itself very soon

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By men who mine

You talk in a natural voice to any moving or stationary location anywhere in the mine.

Each station is equipped with a PRESS-TO-TALK MICROPHONE and a rugged, compact speaker.

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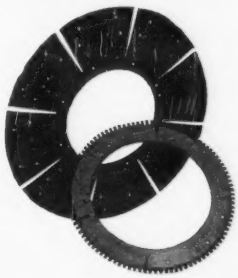

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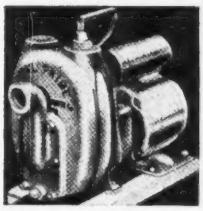

Cap. 3000 to 200,000 G.P.H
Engine or Motor Drive
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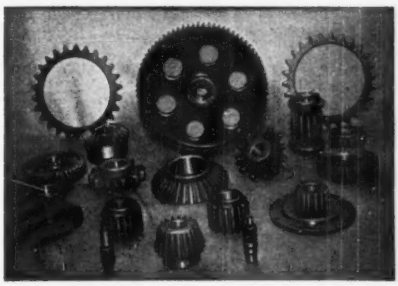

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3—Type A3G Goodman Duck bills.

COAL DRILLS
2—Jeffrey—250 v. DC.

COMPRESSORS—SPECIAL BARGAIN
7—240 cfm Westinghouse 3 cyl. vert. 150 lb. pres. dir. con to 50 HP AC Slip ring or DC Motors.

TRANSFORMERS
20—New 25 kva, 450 v. pri. 220/110 v. 1 ph. 60 cy. Allis-Chalmers.

MOTOR GENERATOR SETS
250 v. DC—Motors 220/440 or 2200 v. 3 ph. 60 cy.

No.	KW.	Make	Speed
1	150	West.	1800
1	135	G.E.	1200
1	100	West.	1600
2	100	Delco	1150
2	75	West.	720
1	60	Cr. Wh.	900
2	60	West.	490

D.C. Generators—250 v. D.C.

No	KW.	Make	Speed
1	250	West.	1200
1	175	G. E.	700
3 New	135	G. E.	1150
1	125	West.	560
1	125	Allis-Chal.	1150
1	110	West.	700
1	100	Allis-Chal.	1150
1	75	West.	750
1	40	G.E.	720

A.C. Generators—220/4000/440/220 v.

No.	KW.	Make	Speed
1	125	West.	257
1	450	Elec. Machy.	120

Pumps With A.C. or D.C. Motors

Qua.	Gpm.	Head	Kind	Make
3	1200	300	Cent.	Worthington
3	1100	323	Cent.	Worthington
3	1000	336	Cent.	Worthington

D.C. Motors—230 volts

No.	H.P.	Make	RPM	Type
1	175	G. E.	550	MD

SAVE OVER 50% ON NEW BLOWERS AND VENTILATING FANS

AXIAL FLOW VENT. FANS
1—4000 cfm 6x3" stat. pres. Sturtevant with 4/1.2 hp., 1750/1150 rpm., 220/3/60 motor.
2—4000 cmf 3" stat. pres. Sturtevant 2 speed AC Motors.
2—5000 cfm 1.8 stat. pres. Sturtevant 220/440 v. AC Motors.
31—6000 cfm Sturtevant Bul. No. 512389, 3" stat. pres., 7 blade dir. con. 5/1.5 hp. 1765/1175 rpm., 220/440 v. AC West. TEFC Motors.
2—6000 cfm Sturtevant 1.65" stat. pres. 220/440 v. AC Motors.
1—7500 cfm Clarage 7½ hp., 220/440 v. 2 speed motor.
2—12000 cfm 3" stat. pres. Sturtevant with dir. con. 10/3 HP. 1775/1180 rpm., 220/440 v. TEFC Motors.

115 VOLT D.C.
8—4000 cfm Sturtevant, 3" stat. pres. West. SK Motors.
4—4000 cfm American Blower, 3" stat. pres. 4/L7 HP. Motors.
1—3000 cfm Sturtevant, 3" stat. pres. 3/1.25 HP. Motor.

HOISTS OR WINCHES
200—1½ ton Hand Cranked ratio 27:1 thru an enclosed double reduction gear unit with 4 planetary gears mounted on steel plate complete with 48' of ⅛" cable, ratchet type brake, push button release.

CAR PULLERS
100—Brand New with ¼" cable, 1½ and 2 ton A.C. or D.C. Motors.

COMPRESSORS
1—315 CFM Ingersoll Rand Portable, 100 lbs. pres. driven by 105 HP Waukesha Oil Engines, 860 rpm.

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100 KW. Diesel Engine Generator Sets

11—100 KW., 250/275 v. D.C. Delco Generators dir. con. to 150 H.P., Model GBD-8, 5½ x 7, 8 cyl. Superior Diesel Engines, electric starting with muffler, power panel and accessories.

Practically as good as new—
Only Used for spares.

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Any Size Any Track Gauge
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Haulage and Gathering Locomotives
20 Ton Jeff. and G.E. 500 v. 42" Ga. (Can be rewound 250 v.)
12 Ton West. 250 v. 36 or 44" Ga.
8 Ton Goodman 500 v. 42/44" Ga. (Can be rewound 250 v.)
6 Ton West. 250 v. 904 Motors 36" Ga.

STORAGE BATTERY LOCOMOTIVES
6—7 Ton Jeffrey 42/44" Ga. BB Motors.
6 Ton G.E. perm. 36/44" Ga. HM 825 BB.
5½ Ton Ironton Type A 36/42" Ga.

MINING MACHINES
112 EG3 Flameproof AC 220/3/60 6' bar. Goodman.
112 EJ Goodman 230 v. DC 7½' bar.
35 B Jeffrey Perm. 230 v. 7½' bar.

M-G SETS—ROTARIES (3 ph. 60 cy.)
500 KW 250 v. West.—714 HP Syn. .8 P.F.
450 KW G.E. 250 v.—710 HP. G.E. Syn. 2200 v.
300 KW 250 v G.E. 600 Rotary.
300 KW G.E. Rotary 250 v with 3-110 KVA 2300/4000 v. Transformers.
300 KW 250/125 v. con. 2-150 KW West. SK 125 v. Gen. dir. con. 450 HP Motor.
100 KW West 125-150 HP West. Ind.
75 KW 75 v. West.—100 HP West. Ind.
50 KW 125 v. G.E.—75 HP G.E. 2200 v.
40 KW 250 v. West.—60 HP West. Ind.

COAL CRUSHERS
18x24 and 18x30 New Scottdale dbl. roll.

AIR COMPRESSORS
1100 cu. ft. 100 lb. pres. Chic. Pneu. 2 stage dir. con. 215 HP West. Syn. Motor.
750 cu. ft. 100 lb. pres. Chic. Pneu. 2 stage Type OCB 17 and 10x12".
356 cu. ft. 100 lb. pres. Chic. Pneu. 12x10.
245 cu. ft. 100 lb. pres. Ing. Rd. ER1, 10x10.
175 cu. ft. 100 lb. pres. Chic. Pneu. 9x8.
164 cu. ft. Chic. Pneu. Steam Type.

DC MOTORS

HP	Make	Voltage	Wdg.	Speed
5	Rel.	230	sh.	1750
7½	G.E.	230	sh.	1750
7½	West.	230	cp.	1050
10	West. SK	230	cp.	1150
10	G.E. CD	230	cp.	1750
13	West. SK	230	sh.	875
15	Cr. Wh.	230	sh.	1750
15	West. SK 110	230	cp.	750
20	West. SK	230	sh.	1750
40	G.E. RC	230	sh.	1150
50	West. SK	230	sh.	1750
50	West. S	230	cp.	875
60	Rel. T 461	230	sh.	800/1200
125	West. SK 193	230	sh.	450/1000
200	G.E. RC	550	cp.	875
375	West.	230	cp.	430/860

AC MOTORS (3 ph. 60 cy.)

HP	Make	Wdg.	Spd.	Type
300	G.E.	S.R.	600	IM
300	West.	S.R.	450	IM
300	West.	S.R.	600	CW
150	G.E.	Syn.	600	ATI
125	West.	Syn.	277	——
100	G.E.	S.R.	450	IM
100	Al. Ch.	S.R.	600	——
75	G.E.	S.R.	575	ITC
75	G.E.	S.R.	600	IM
75	West.	S.C.	900	CS
50	Al. Ch.	S.C.	1750	——
50	G.E.	S.R.	900	IM
50	West.	S.R.	600	CW
50	G.E.	S.C.	900	IK
50	G.E.	S.C.	1150	KT
40	G.E.	S.C.	860	KT
35	G.E.	S.C.	1200	IK
25	Cr. Wh.	S.C.	600	——
25	Cr. Wh.	S.C.	860	——
25	Cr. Wh.	S.R.	600	——
15	G.E.	S.C.	1120	KT
15	L. A.	S.C.	3600	——
15	West.	S.C.	1750	W326
10	West.	S.C.	1160	CS
7½	West.	S.C.	1750	CS
5	West.	S.C.	1160	OS

REDUCTION UNITS
500/700 HP Morse Chain Drive. 4.28 to 1.
300 HP V Belt dr. pulleys 30" and 48" supported by 2 roller bgs. with pedestals.
150 HP Nuttall 1.6 to 1.

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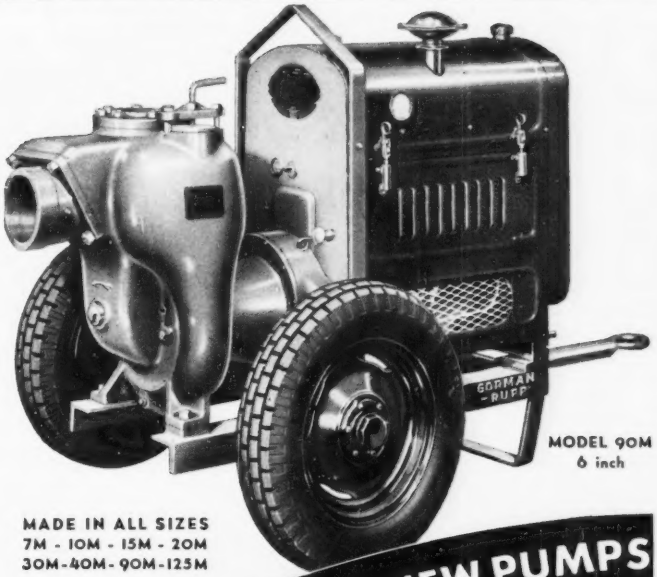
COAL MINING INSTITUTE

(Continued from Page 25)

both on the side of labor and on the side of management. Philosophers generally classify "all kinds of men" as either ignorant or intelligent, staid or eccentric, brave or cowardly. To make such a heterogeneous collection harmonize and prosper requires a leadership that is intelligent, honest, and fearless, and that possesses foresight, prudence, knowledge and zeal. I believe we have that type of leadership in this great industry of ours, both on the side of labor and on the side of management, and it will be only under the combined leadership that we shall be able to bring about the better understanding that is so essential to the future welfare of our industry.



MODEL 90M
6 inch

MADE IN ALL SIZES
7M - 10M - 15M - 20M
30M-40M-90M-125M

GORMAN-RUPP'S NEW PUMPS

CHALLENGE ANY PUMP TO MATCH THEIR PERFORMANCE

With a new complete line of Contractors' Pumps, Gorman-Rupp has topped their own past high record of performance with a better pump --

-- **QUICKEST PRIMING**
-- **HIGHEST PRIMING**
-- **PUMPS MORE DIRTY WATER**

Compare them for priming speed:

The new Model 15M (3") primes at 25 ft. suction lift in 61 seconds.

The new Model 90M (6") primes at 25 ft. suction lift in 44 seconds.

And the Gorman-Rupp is still the most simple pump --

No ports, no valves, no clean-out plates, nothing to cause stoppages.

Write for the new Contractor's Bulletin 8-CP-11

THE GORMAN-RUPP *Guarantee*

Our distributor's are authorized to put a Gorman-Rupp Contractor's Pump on any pumping job, anytime, anywhere, alongside any other make pump, size for size. The Gorman-Rupp pump is guaranteed to pump more dirty water, more hours, using less gasoline, to prime quicker and at higher suction lifts than any other self-priming pump. If it isn't the best all around pump, our distributor will accept the return of the Gorman-Rupp pump and pay the user any installation expense incurred.

THE GORMAN-RUPP COMPANY
MANSFIELD, OHIO

Only Compound M Can Effectively Control Coal Dust

Only COMPOUND M can wet concentrated airborne coal dust. Water alone cannot wet small coal dust particles because of its high surface tension.

COMPOUND M controls coal dust on all mechanized operations—cutting, loading, conveying, dumping, and tipple preparation.

Recommended by leading authorities and hundreds of satisfied users.

Write for complete details.

Compound "M" Automatic Cartridge Proportioner

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PHILADELPHIA 6, PA.

SALEM "HERCULES" AUGERS FOR ELECTRIC DRILLS

Made To Withstand High Drilling Speed, Whip And Torsional Strain Of Electric Drills

Drills holes faster— Will not snap off shank or chip points— Outlasts four or five ordinary augers.

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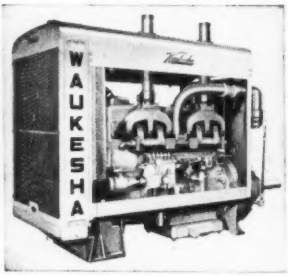
COMPLETE ENGINES AND SERVICE PARTS



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- Kohler Light Plants
- Prestone Anti-Freeze
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- S & M Shovel-lites
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HILAND 1000

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Save more than $4000.00 per unit. Model 75-S, 8½ yd. tractor, cab electric brakes.
5—brand new; 2—used three weeks. New equipment guarantee.

2—TERRA COBRAS

Used only a few weeks. Model TA Tractor; TCY scraper has 18 yd. heaped capacity. New equipment guarantee. Reduced to $17,500 each.

Ready for shipment today
Wire or phone Harry Maloney for complete details

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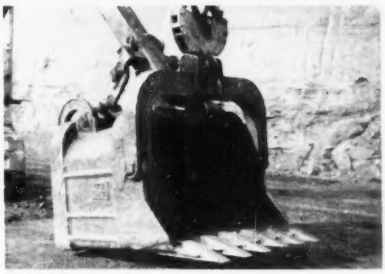
Strongest Per Pound . . .
More Payload Per Pass



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DRAGLINE BUCKETS

Are made of wear resisting Manganese Steel which polishs in use, minimizes friction, becomes harder and tougher the more it works. Hollow arch construction reduces weight and increases strength.

Built For Long Life

ESCO buckets outlast other makes and operate with less maintenance work and expense.

Designed For Efficient Digging

The clean cutting lip of ESCO dragline buckets contains integrally cast streamlined tooth horns. LONG, SHARP, TEETH are placed for maximum efficiency with outside teeth placed near edges to make the bite WIDER and digging easier.

Coal Strippers Know

That they can often use larger size ESCO buckets than would be possible with other makes, due to maximum strength without excessive weight.

An Esco Bucket For Every Job.

Made in four types: Medium, Stripping, Standard and Heavy Duty, in sizes from 3/8 to 18 yards.

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728 PORTER ST., DANVILLE, ILL.

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